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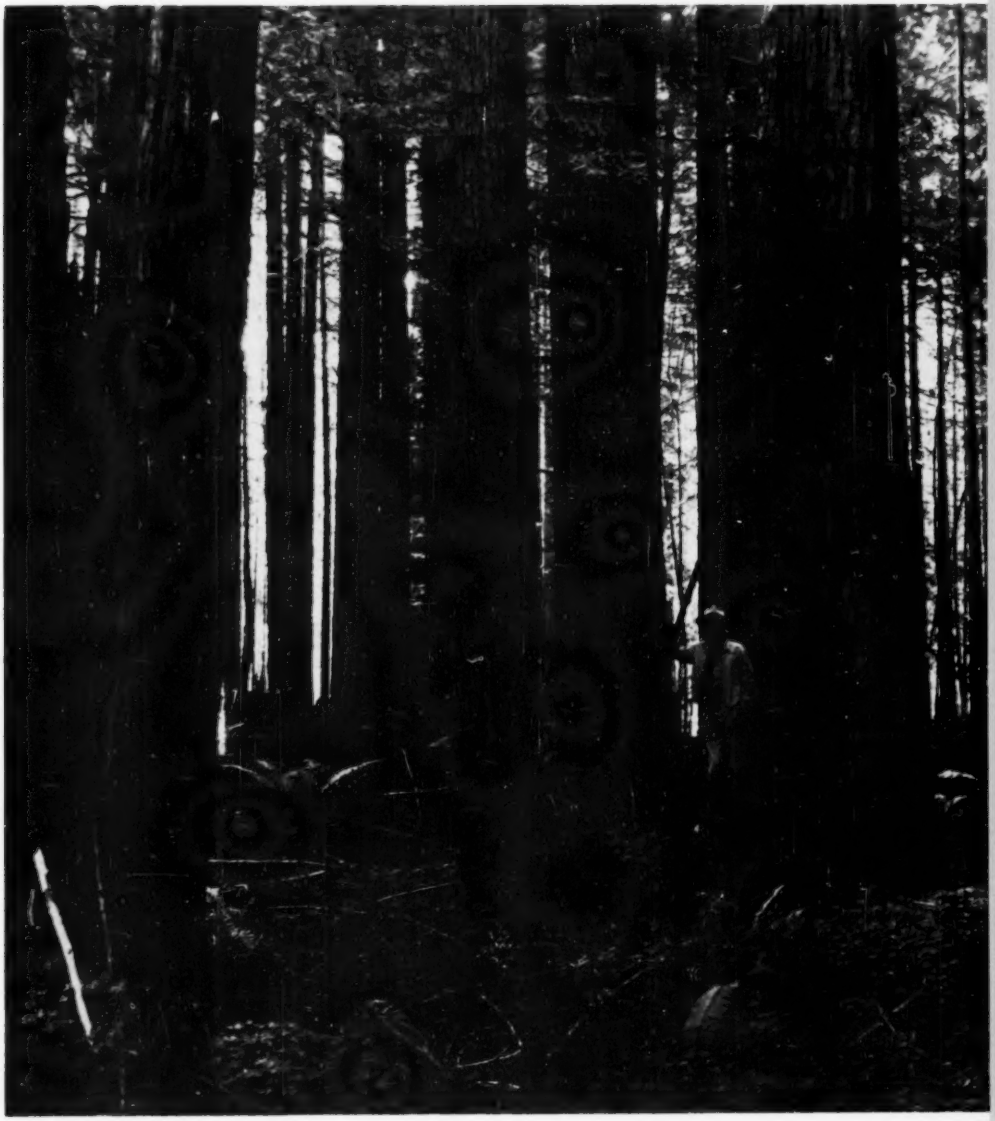

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Journal of Forestry

Official Organ of the Society of American Foresters

State Park Programs and the Redwood Industry[1]

Kenneth Smith

Treasurer and assistant to president, The Pacific Lumber Company, San Francisco, Calif.

Although concerned with a special case of public parks this article has wider implications because it touches on park problems faced in other forest regions. The author believes that the program of state redwood park acquisition and extension is no longer realistic; most of the superlative groves have been acquired and should be left, except for dangerous trees, in their primeval condition for their inspirational values; park areas not of a superlative character and less accessible should be cut selectively, but lightly, and thus opened for stand improvement and recreation and to make them pay their way. He recommends that the park proponents reveal their plans so that owners and operators will know which stands are desired for parks; he suggests further that the matching-money principle can no longer be depended upon for large gifts and that the state legislature should make one appropriation and complete the program before prices and inflation make it inordinately expensive or impossible.

THERE IS NO FOREST more majestic than the coast redwoods of California. As a living natural wonder and as an inspiration to visitors they are without parallel. Not all of the great redwood forest area is of this superlative character. But the part that is superlative and also reasonably accessible should be preserved in state parks. As a redwood lumberman I am for it personally and I believe most of the redwood industry is for it. I have taken many eastern visitors to Big Basin, Muir Woods, Bull Creek Flat, and the Founder's Tree to impress them with our redwoods and to give them something to remember. Like many other redwood lumbermen, I derive much pleasure and inspiration from our state redwood parks. After many visits I am still as awed in a cathedral grove of redwoods as a tourist on his first visit. Naturally, one visits only the best of the groves. It is not true that all the redwood forest is as grand, as inspirational, and as magnificent as the groves already in the parks. It is on this fact and on the ambitious park plans that lumbermen differ with park enthusiasts. Redwood lumbermen believe that it is high time that those who are legally responsible and those who have voluntarily appointed themselves leaders in interesting the public in the problem of providing recreational facilities for a prospective California population of 20 to 30 million people, quit being emotional about it and start being realistic. The emotional approach of the past is not at all to be disparaged. It has served a good purpose in arousing public interest and sentiment. It intensified the world-wide interest in the redwoods. It resulted in the preservation of the most outstanding groves of Coast redwoods, and also added more groves of Sierra redwoods to the already existing chain of public parks in the Sierra Nevada. It succeeded also in preservation of more stands of sugar pines which are less advertised only because they are less distinguished for enormous size.

There are still a few superlative redwood groves that should be acquired and added to the park system. However, if not another one is bought, there are enough in parks now to satisfy the coming generations of one-look tourists. What is even now inadequate, and will be woefully so unless some practical realism replaces the outmoded programs geared mainly to saving specimen groves from the rapacious woodsman's axe is the forest recreation areas for the masses who are now and will be clamoring for them.

From an experience of 41 years as a lumberman, 25 of which have been with organizations sincerely interested in fostering true conservation, I am convinced that the public of tomorrow and the taxpayer of today would be better served by a policy of purchasing selectively cut lands for recreation purposes and by light selective cutting of parts of the enormous areas presently locked up in natural parks. Such areas are cheaper to acquire and are more economical to develop for recreation. It is not good conservation to lock up unnecessarily large areas of virgin forests only to have the mature trees die, fall, and rot, add to the fire hazard, and become an economic loss.

By "recreation," in this presentation, is meant mostly camping. There is, of course, the inspirational aspect. To preserve it, selected areas of superlative stands of pine, redwood, and fir forests should be left intact except for the removal of dangerous trees. But for camping and general recreation, an area from which the dangerous and over-mature trees have been removed is far safer than is

[1]This article is a condensation of an address before the Section on Forests and Recreation, Commonwealth Club of California, San Francisco, December 12, 1951.

that which has not been so thinned by selective cutting.

Parks and Recreation

We should make a finer distinction between park areas and recreation areas, even though the term "park" may be useful as an overall designation. And we should recognize as of mainly scientific value, this or that area in which there would be limited development and where nature would be permitted to operate in her appointed way. There would be high-altitude areas for "Primitive Areas" and others set aside largely for their inspirational value. Among the latter I would put the Bull Creek and Dyerville Flat redwood groves and the strips paralleling the Redwood Highway. Even in these, because of their easy accessibility, the many visitors, the danger to the forest and to the people of falling trees, and, of course, the fire hazard, those trees that are obviously insecure should be felled before they fall of their own accord and carry others down with them; and there should not be permitted an excessive accumulation of fallen timber on the ground, such as is already developing in the Bull Creek Flat grove. We must recognize that, once visitors are permitted to ramble through these stately groves, the "balance of nature" is upset and that we must make some provision for the protection of the people and of the forest itself.

What most forest recreation seekers want is room to have fun. They want to get at the woods, to have places to sleep or to camp where the woods are open and light enough and where there are plenty of safe trails.

Yet the policy of public and private proponents of redwood parks is almost wholly concentrated on locking up still more virgin areas to grow old and go to waste. The locking up itself has been carried to extremes. Not only is cutting prohibited, but fire hazard reduction as well.

Redwood lumbermen have long since become inured to being characterized as monstrous destroyers of these Christ-time giants for pieces of silver. They can go on enduring it, but, times have changed. The program of the past does not any longer make sense, regardless of how efficacious it was in the years before the political plunderers took over. The money is not there anymore and it is not going to be there.

Emotional Appeal Losing Its Effect

Not only is the emotional appeal going to be less and less productive, but the fact that we have adopted inflation as a way of life precludes any possibility of ever acquiring more of such properties at costs even remotedly resembling acquisition costs of the past. There will be fewer and fewer gift dollars and those fewer dollars quite likely will be only 10-cent to 20-cent timber dollars compared with the old ones. The program being pursued now is doomed to fail. It has not a prayer of providing adequate forest recreation areas for a mass California public of between 20 and 30 million people and the hordes of out-of-state tourists.

It is not even pointed in that direction. The emphasis has been almost religiously, sometimes fanatically, on "saving" every redwood tree that could be acquired—the "woodsman spare that tree" approach. Development of the parks as forest recreation areas has been secondary and handicapped by the fetish of preserving wilderness areas—"the forest primeval" —for posterity.

One wonders if any of the authors of these emotional versions of the beauties of the forest primeval ever saw a redwood natural area, much less tried to find his way through one.

In the remarkable journals of two of the first men who tried it, Rogers and Wood, we have some very graphic pictures of what it is really like. A few excerpts from *The Quest For Qual-A-Wa-Loo*, reciting the experiences of these miners and woodsmen in traversing the area just east of Trinidad is illustrative:

> The timber in this part of this country is principally hemlock, (spruce) pine, (Douglas fir) and white cedar, (The redwood) the most of the cedar trees from 5 to 15 feet in diameter, and tall in proportion to the thickness, the underbrush, hazle, oak, briars, currants, gooseberry, and Scotch cap bushes, together with alder, and sundry other shrubs too tedious to mention; the soil of the country rich and black, but very mountainous, which renders travelling almost impassible.
>
> Where the forest did not exist grew dense jungles of chaparral, buck brush and white thorn brush that were so thick as to make their passage almost impassible.
>
> Through this forest we could not travel to exceed two miles a day. The reason of this was the immense quantity of fallen timber that lay upon the ground in every conceivable shape and direction and in many instances one piled upon another so that the only alternative left was literally to cut our way through. To go around them was often as impossible as to go over them. There was not the least sign indicative of the presence of any of the animal creation; indeed, it was almost as impenetrable for them as for us, and doubtless never resorted to save for purposes of shelter.
>
> For three long weary days did we toil in these redwoods. Exhaustion and almost starvation had reduced the animals to the last extremity.
>
> At length we issued from this dismal forest prison in which we had so long been shut up, into the open country, and at the same instant in full view of that vast world of water—the Pacific Ocean.

How many tourists and how many natives care about that kind of forest for recreation? Yet, most of the 72,000 acres of redwood parks are just that, and we had just as well not have them so far as any good they do in the way of providing recreation opportunities for the public.

The literal truth is that even the trail system already built is not maintained in good shape, for lack of money. There are a number of fine "showcases" along the Redwood Highway, displaying superlative specimens and groves and offering the breathless and awe-inspiring thrill of cathedral groves, but much less to offer the seeker of forest recreation than the less publicized pine areas.

So the first thing needed is to bring about a mental house-cleaning, in order that a climate may be created in which a realistic program can be developed. The idea that not one tree can be cut for any reason in any of these parks has to go out the window and with it the smart practice of the past of

buying strips and blocking access so that small holders could be bludgeoned into selling cheap to the Park Board.

It is only two or three years since this abuse was curbed by legislation requiring the Park Board to permit reasonable access through park property and the Save-the-Redwoods League used every effort it could to defeat this incursion of access roads.

The whole concept of the "inviolate wilderness area" has to be supplanted with a common-sense program for cleaning up the present accessible flats so that they will not continue to deteriorate. Down trees should be cleared out, and leaners and badly over-mature trees logged out before they fall and destroy good trees. The finest flat of all, Bull Creek Flat, is sadly in need of cleaning up, as is much of the accessible area in northern Humboldt County.

Then the back portions of the locked up areas should be opened up and cut selectively. Not logged as would be a tree farm, but logged with the idea of opening them up so they can be used as recreation areas. The standard of tree selection would be lighter and would be arrived at by experienced foresters and park men. As already indicated, the flats should just be cleaned up, but back of them the forest should be progressively thinned out so that the sound thrifty residual trees have a chance to grow. That is the only way to leave fine specimen trees for posterity. And these residual trees, growing in parks for a few hundred years more, actually will be finer and safer specimens than most of those we have now, which grew up in the fiercest conceivable competition and have been injured and weakened by many pre-white-man fires.

In time all the beautiful specimens one now sees will be gone, yet they not only can be replaced but the number of big trees actually increased, by selectively cutting out enough trees to make an accessible park of the remainder, and giving those left a better chance to develop.

A by-product of this will be much greater ease of protection from fire. Our parks are not now nearly so well guarded against fire as are operated timber stands, and the more they are opened to the public the greater will be the need.

Another by-product will be a realization by the public of what the lumber industry has long known —that earlier cutover areas that now have heavy stands of second growth upon them are far more desirable for recreation purposes than most virgin stands.

Unless that changed concept is brought about there is no prospect that adequate forest recreation areas will ever be provided.

If it is brought about so that, as already suggested, a climate is created in which forests for recreation can be considered realistically, then every force should be concentrated upon determination of a policy—a decision as to which areas are wanted for additions and which ones are not, so the lumber industry can go ahead and run its business on the lands not required or wanted for parks. When park-minded people quit singing the "woodsman spare that tree" chant and make up their minds as to what constitutes a reasonable and adequate forest recreation program they will have greater cooperation from the lumber industry in trying to get it.

Lumbermen don't "destroy" trees for fun. They fell, log, and convert them into marketable products because the public demands lumber. As long as lumber is needed, trees will have to be cut. Lumbermen are merely those people who have elected to make their own business that of supplying a public need for lumber.

The redwood lumbermen have businesses to run that require planning many years ahead and they have a right to know what part of their holdings the state wants to buy, even if they cannot be guaranteed that the state will buy it, so that they can go ahead with their own expensive long range tree farm programs.

Acquisition of Recreation Areas

Left for last is consideration of how adequate forest recreation areas can be purchased, because there is no use talking about that until we quit talking nonsense and come to an agreement on a program that would provide what the people want. And what the people want is, not only groves for inspiration, but plenty of recreation areas where they can holiday at a modest cost.

When we have unanimity of understanding of what the need is, what the problem is, and how it might be accomplished, then there will be a reason for talking about financing it.

When that point is reached there will be staring at us in the face these matters:

1. Dependence can no longer be placed on gifts in an economy which is redistributing existing private fortunes and preventing the accumulation of new ones, which means that the "matching fund" principle must be abandoned.

2. In an economy where "inflation is the way of life" and growing scarcity is compounding the inflated value of virgin timber stands, it will cost far, far more to complete the program of acquisition a bite at a time over a long term of years than to do it all when the program has been agreed upon.

The inevitable solution is a program that will assure the mass public the kind of forest recreation areas it wants; then selling it to the people and getting the money in one package from the legislature. That means a bond issue that will fix the cost posterity will pay for its investment in forest recreation areas, except for current maintenance. That will be by far the cheapest for them. And it will be as it should be. If enough foresight is developed in our generation to leave for future generations really adequate forest recreation areas at a price that, when they are using them, will be very cheap in the dollars of that day, they should be happy to pay off the bonds and bless our memory for having given them the opportunity.

Summarizing:

1. Take a good long hard look at the existing emotional vested interest in perpetual "save trees from the rapacious lumbermen" programs to see if they make sense in the world we live in today. If it is decided that they do, then the rest of these recommendations can be ignored and efforts can be made to make present programs work.

2. If it is decided they do not any longer make sense, then a solution can be sought that will work. There is now no easy solution. A program must be built that the people want enough to pay for, because there is no longer even a prayer of doing more than acquiring a few more superlative groves from gifts. It will involve: (a) thinning out parts of present holdings to make them more useful and to give nature a chance to grow even finer specimen trees faster to replace those that will be inevitably lost, and (b) placing major emphasis on accessibility and suitability for mass public recreation areas in future acquisitions.

3. Decide what is wanted and what is not wanted for park additions. Give the lumber industry a chance to cooperate in setting aside the somewhere between 5 percent and 10 percent of acreage of existing virgin and high grade young stands that represents the maximum possible park acquisition program, and, stop pointing the finger of scorn at the lumberman for running his business of growing, harvesting, and giving utility value to the trees on the other 90 to 95 percent of timberland — a business which is just as legitimate and honorable as that in which any of its detractors are engaged.

4. Recognize that redistribution of accumulated wealth and embracing egalitarianism as our economic and social pattern for the future means that adequate forest recreation areas for 20 to 30 million egalitarians cannot and will not be provided as gifts from this generation. Then lay the cards on the table and give the egalitarians an opportunity to pay for what they want. If the job is honestly done—if they are permitted to participate in preparing the program and it does contain *what they want* —if it is then properly merchandised as a package, I believe they will buy it and be glad they did.

A Preliminary Report on Prescribed Burning in Virgin Ponderosa Pine[1]

Harold Weaver
Assistant chief, Branch of Forest and Range Management, Bureau of Indian Affairs, Washington, D. C.

IN PONDEROSA PINE STANDS of the White Mountains of east-central Arizona on the Fort Apache Indian Reservation, tests are now being made of the feasibility of employing prescribed burning for thinning of dense reproduction in such manner that improved growth and quality will result and for reducing fire hazard. These tests have been underway since the fall of 1948 and, until the late fall of 1950, were concentrated on limited areas in the vicinity of the sawmill town of McNary, above the Mogollon Rim in the northern portion of the reservation.

The Southwestern Forest and Range Experiment Station assisted during the summer of 1950 in establishing twelve 2.5-acre study plots near Blue Mountain, several miles east of McNary in dense, even-aged sapling and pole stands that for the most part originated after selective logging operations of 1923 and 1924. It was planned to select six of the plots at random for prescribed burning and to reserve the other six unburned plots as check areas. Six of the plots so selected and surrounding areas were burned at various times during late September, October, and early November 1950 (2). Additional reports will be prepared as data from these plots become available in future years.

During late November and December 1950, prescribed burning was continued on extensive areas of virgin ponderosa pine characterized by dense understory stands of reproduction, where hazard had increased to extreme proportions and where many thousands of dollars had been expended during several previous years in combatting numerous and damaging fires started by lightning. Even at this early date, results with respect to hazard reduction appear highly significant. They are of particular interest when it is remembered that the ensuing fire season of 1951 was one of almost unprecedented hazard and danger, and that several extremely large and destructive fires burned in other portions of the southwestern ponderosa pine forest. For these reasons it is appropriate to describe the extensive burning operations, to present the factual data thus far obtained, and to illustrate results by means of photographs.

Location, Topography, and Stand Conditions

Area 1, comprising approximately 38 sections, was burned between the dates of November 21 and December 30. It is situated on the broad southwestern slope of the White Mountains 18 to 26 miles south-southeast of McNary, in the eastern portion of the reservation. It is bounded along the east by the deep canyon of Little Bonito Creek, along the north by Rock Creek and the East Fork of Whiteriver, and on the south and southwest by the juniper-pinon woodlands and

[1]This article represents the author's views only and is not to be regarded as an official expression of the attitude of the Bureau of Indian Affairs on the subject discussed.

open grasslands. Elevations vary from approximately 6,000 feet above sea level in the deeper canyons to 8,300 feet on Marshall Butte in the extreme northeast.

As viewed from the open grasslands to the southwest, the area appears deceptively gentle in slope and easy of access. Actually, though extensive rolling slopes and tablelands are encountered, it is difficult of access because of the deep, rocky canyons and rim rocks. The only forest protection road traversing the area has become almost impassable because of lack of funds for maintenance.

Site conditions are excellent, and ponderosa pine is above average with respect to stand per acre and quality. It appears that 30 to 40 years have elapsed since extensive portions of the area were covered by previous fires. The ground under the larger pines and in the openings was densely stocked with ponderosa pine reproduction of approximate age class 30. Over extensive portions these little pines were so crowded that they were stagnated and whip-like.

Occasional associate species encountered are Mexican white or limber pine (*Pinus flexilis var. reflexa* Engelm.), Douglas-fir (*Pseudotsuga taxifolia* (Poir) Britton) and white fir (*Abies concolor* (Gord. & Glend.) Hoopes). At higher elevations aspen (*Populus tremuloides* Michx.) is also found in mixture. At lower elevations the stand is much lighter, and alligator bark juniper (*Juniperus deppeana* Steud.) becomes an associate in the overstory and in the reproduction stand. Near the lower pine fringe, juniper reproduction becomes predominant over certain portions of the area.

Snags were numerous before the burning, and the groups of dense reproduction were laced with many windfalls. Hazard for such stands was extreme and fires starting from lightning in previous years had become increasingly difficult to control.

Area 2, comprising approximately 40 sections, was burned between the dates of December 1 and 30. It lies along the Mogollon Rim, approximately 40 to 48 miles west of McNary in the western portion of the reservation. Elevation varies from approximately 6,000 feet to 7,400 feet atop Chediski Peak. Topography is rugged, with steep canyons and sharp ridge tops. This area is also difficult of access because of deteriorating protection roads.

Here the pondersoa pines are shorter, of considerably poorer quality, and comprise lighter stands than do the pines of Area 1. Again the reproduction stands are dense and fire hazard is high. Lower elevations of this area are characterized by exceedingly dense stands of juniper reproduction that have largely monopolized the ground under the pines. Some of the steep canyon slopes are also covered by brush fields, in which manzanita is the predominant species.

Area 3, comprising approximately 22 sections, was burned between the dates of December 15 and 30. This area lies along Lake Ridge and Faught Ridge approximately 8 to 16 miles west and southwest of McNary, in the central portion of the reservation. Again topography is rugged and the area difficult of access.

With respect to stand conditions and hazard the area is similar to Area 2. It is of interest to note that in early September 1950, on an area immediately adjacent to the southwest, an incendiary fire destroyed two and one half million board feet of ponderosa pine before it could be brought under control. Deterioration is rapid in such fire-killed timber and it was necessary to conduct salvage logging during the spring and summer of 1951 to prevent serious loss.

The area estimates of the number of sections burned are based largely on a survey made from an airplane on December 30, 1950, when all the fires were dying, and are the best approximations that could be made under the circumstances. A snow storm the following day ended all burning.

Weather and Burning Conditions

The late fall of 1950 was characterized by cold, dry weather. Nights were usually frosty and days usually sunny and quiet. While the burning was being conducted, daily temperature readings were taken at McNary, elevation 7,200 feet; at Indian Agency headquarters at Whiteriver, elevation 5,200 feet, 20 miles south of McNary; and at Forestdale, elevation approximately 6,500 feet, about 11 miles west-northwest of McNary. From December 19 to 30 daily temperature readings were also taken at Round Top Lookout, elevation 6,800 feet, several miles south of Area 3 on Lake Ridge.

Temperature, relative humidity, fuel moisture, and wind velocity readings were also taken occasionally on Area 1 while burning was in progress. Frosts occurred each night and maximum air temperature during the day was 55 degrees F. Maximum wind velocity was estimated at 12 miles per hour. On November 27 at 6,800 feet elevation, fuel moisture was measured at 7 percent and on December 1 at the same place at 8.5 percent.

While burning was in progress on Area 3, daily measurements taken at Round Top Lookout between December 22 and 30 indicated a variation in maximum daily temperature between 37 and 58 degrees. Relative humidity varied between 12 and 30 percent and fuel moisture between 6.0 and 7.5 percent.

Manner of Conducting the Burning and Fire Behavior

The usual procedure was to set fires in strips along ridge tops on the highest portions of the various areas then to permit them to creep slowly down into the canyons and across the tablelands and gentle slopes to the southwest, against the prevailing wind from that direction. Homemade drip torches were used for setting the fires during most of these operations. Another effective and more rapid method was throwing lighted matches from horse back.

Protection roads and natural barriers such as streams, rim rocks, and, in one instance, a 1950 burn were largely depended on for pre-

venting the fires from escaping from control. One tractor and plow unit was held on standby and several tractors with bulldozers, capable of plowing fire lines, were available in case of trouble. They were not needed.

The fires moved slowly. One observer, during the afternoon of December 18, reported that the fire in Rock Creek Canyon moved about 1 foot each 4 or 5 minutes across level ground under mature trees. In 1 hour he heard five snags fall. (At 4:00 p.m. as he walked it was so cold that his hands felt like they were freezing.) Of interest to biologists in wildlife management may be the fact that he met six deer browsing along the edge of the fire.

In every respect the weather appeared ideal for prescribed burning. While the forest fuels after the long rainless fall were very dry, ignited readily, and continued to burn during even the coldest nights, crowning in the reproduction patches occurred rarely, except on very limited areas immediately adjacent to spots where fierce fires consumed pitchy windfalls or snags. Air temperature appeared to be the critical factor. Even at noon on cool days the fire apparently could not build up sufficient intensity to cause extensive crowning.

Results and Discussion

The prescribed burning on all areas consumed and reduced the lighter fuels of the forest floor, such as fallen needles, cones, branch material, and partly disintegrated wood, by approximately 55 percent by weight (Fig. 1). It also reduced the heavier forest fuels, such as snags, windfalls, and stumps, by 64 to 80 percent by cubic foot volume (Fig. 2). Similar results were obtained on the six study plots that were previously burned at Blue Mountain, under similar fuel moisture conditions. It is believed that fully as effective results were obtained on the more extensive virgin areas treated. It should be emphasized that our observations thus far indicate that prescribed burning has led to *no accelerated erosion*.

FIG. 1.—This area on Marshall Butte was prescribed burned in the fall of 1950 and photographed in May 1951. Around the bases of the larger trees, as at right, and adjacent to windfalls and other debris the needle mat burned clear down to the mineral soil. Elsewhere, over the greatest portion of the forest floor, the fire removed only the surface of the needle mat. No accelerated soil movement has been observed following this burning.

The airplane observers of December 30, 1950, reported that countless thousands of snags and windfalls were consumed, leaving beds of white ashes. This is one of the greatest benefits derived from the prescribed burning, since fires in such material under adverse conditions in the summer time are apt to cause crowning of even the largest trees. Old, rotten snags and windfalls also ignite readily from lightning or sparks. A very large portion of spot fires start in dry, rotten wood.

That the prescribed burning operations very effectively reduced fire hazard is indicated by the data presented in Table 1.[2] Again it should be emphasized, in noting the great reduction of number of fires inside the prescribed burned areas, shown in Table 1, that the fire season of 1951 was one of the most critical and dangerous ever recorded. The 19,000-acre fire on the Apache National Forest, closely adjacent to the east, was in view of the Fort Apache foresters as it swept over the top of 11,000-foot Mt. Escudilla. For days relative humidity readings at Whiteriver had averaged only 6 percent, so the

[2]For information and data the writer is indebted to Harry R. Kallander, forest manager, and Silas Davis, fire control officer. These men planned and supervised the burning operations in the woods.

FIG. 2.—At this spot on Marshall Butte, photographed in May 1951, a snag was burned down and almost entirely consumed by the prescribed fire of the previous fall. Snags and windfalls by the countless thousands burned up in similar manner.

concern of the men of Fort Apache can well be imagined. The fire control officer reported: "We spent hours planning strategy on the big one we thought sure would happen most any hour. All fires regardless of size symptoms received a smothering mass of fire fighters and equipment. We did everything possible to bring about control before the next burning period." In the light of this statement Table 1 speaks for itself.

Table 1 indicates that despite the extreme hazard and danger of the 1951 fire season it was necessary to control only eight fires on the 65,000 acres prescribed-burned the previous fall. These fires were easy to control; they covered only 4 acres. Though the prescribed burned areas comprise only 7.5 percent of the total area receiving protection, they were above average with respect to hazard before the prescribed burning treatment. During 1951, however, the 4 acres burned comprised only 0.8 percent of the total acreage burned on the reservation.

TABLE 1.—NUMBER OF FIRES CONTROLLED AND NUMBER OF ACRES BURNED INSIDE AND OUTSIDE PRESCRIBED BURN AREAS ON THE FORT APACHE INDIAN RESERVATION, ARIZONA—1948 TO 1951 INCLUSIVE

	Years							
	1948		1949		1950		1951	
	Inside[1]	Outside[2]	Inside	Outside	Inside	Outside	Inside	Outside
Number of fires controlled	36	202	28	195	45	252	8	284
Number of acres burned	1,105	8,645	141	365	815	5,664	4	477
Percent of total burned area	11.3	88.7	27.9	72.1	12.6	87.4	.8	99.2

[1] "Inside" refers to 65,000 acres of ponderosa pine before prescribed fire treatment of November and December 1950, and same area during fire season of 1951.

[2] "Outside" refers to the remainder of protection area of 791,000 acres, including 488,000 acres of ponderosa pine.

It is realized that but a very short time has elapsed since the prescribed fire treatment, and that as fuel again accumulates with passage of time, lightning fires will start and spread with progressively greater rapidity. Experience on other prescribed burned areas, however, indicates that for many years fire control will be comparatively easy. This conclusion is also borne out by experience on certain areas burned over by wild fires, where, through accident, similar results have been attained. One of these areas has already been described by the writer (*3*). Prescribed burning repeated once every 7 to 10 years would serve to prevent excessive accumulation of fuel such as that which now must be contended with. The Blue Mountain plots should provide valuable data on rate of accumulation of forest fuels subsequent to prescribed burning.

Data with respect to degree of thinning and to possible accelerated growth and improved quality in surviving sapling and pole-sized ponderosa pines will be accumulated through future measurements to be taken on the Blue Mountain plots. Saplings and poles that have survived wild fires burning through dense reproduction stands have subsequently responded with accelerated growth and with improved quality (*1*). There is every reason to expect similar results from the prescribed burning herein described.

Figures 3 and 4 will aid in visualizing action of prescribed fire in thinning dense sapling and pole stands. Although these photos were taken only recently of an area prescribed burned at Bog Creek, east of McNary, in October 1948, it is believed that it will be

FIG. 3.—A portion of area prescribed-burned near Bog Creek, several miles east of McNary, in October 1948 and photographed in November 1951. Note that the ground was largely cleaned of windfalls, cull logs, stumps, and other debris. Note also that every grass plant has been cropped. Cattle and horses tend to congregate on recently burned areas.

possible to duplicate them many times on the extensive prescribed-burned virgin areas, after the fire scorched needles completely fall from the deadened trees and from the lower crown portions of the surviving trees.

As may be judged from the photos, prescribed fire does not result in even spacing of surviving trees. Thinning is spotty. In some places not enough trees are deadened while in other places too many are taken. On the average, however, prescribed fire does a reasonably effective and conservative job of thinning. The aerial observers of December 30 and subsequent observers from airplanes report that excessively thinned spots in the reproduction stands above .05 to .1 acre in size are very rare. Over the whole 65,000 acres of virgin ponderosa pine they estimate that a total of only 15 acres have been thinned too severely.

Ashes and exposed mineral soil, where the fires consumed snags and windfalls, afford an admirable seed bed for ponderosa pine, provided that seeds are available and subsequent moisture conditions are favorable (*3, 4*). The year 1950 did not appear to be a good ponderosa pine seed year on the Fort Apache, and subsequent moisture conditions during 1951 were very unfavorable. During 1951, however, a good seed crop was produced and moisture conditions have since greatly improved. Whether ash and mineral soil beds one year after the burning will still provide conditions favorable for ponderosa pine seedlings remains to be seen. The year 1948 was a good seed year on the Fort Apache, and following prescribed burning near Bog Creek, during October of the same year, many seedlings came in along burned-out windfalls, cull logs, and stumps. Most of these seedlings are still flourishing, despite severe drought conditions of 1950 and 1951.

Effects on grass cover of the forest floor will be watched with considerable interest. It has been the writer's observation that the burning will encourage the native perennial grasses, provided that domestic stock can be prevented from congregating too heavily on the burned areas (*4*). It is hoped that the Blue Mountain plots will furnish valuable data.

Effects on water production should certainly be studied. In the arid southwest such studies may indicate results of greatest importance. In this connection the writer has previously indicated his belief that present dense reproduction stands are adversely affecting the larger merchantable pines through intense competition for limited soil

FIG. 4.—November 1951 photo showing typical thinning in ponderosa pine saplings and poles caused by prescribed burning near Bog Creek in 1948.

moisture. Unfortunately the Fort Apache foresters are not equipped or prepared to study such effects. It is doubted that the Blue Mountain plots will furnish much information on soil moisture.

Burning down of occasional fire-scarred or "cat-faced" trees is believed by the writer to be the only objectionable feature of the prescribed burning operations. The extent of this loss is not now known. From the fact that in preparation for future prescribed burning, needles and debris are being raked away from "cat-faces," and sections are being bucked out of windfalls lying too close to standing live trees at an average cost of only 8 cents per acre, it may be surmised that past losses have not been of much significance. More data are needed.

It is realized that weather similar to that of the fall of 1950 occurs at rather infrequent intervals. During practically every fall, however, favorable weather periods of several days to two or three weeks occur. Through trial and error and through experience with burning, several individuals have been able to judge when conditions are favorable. Precise measurements have not been developed, however, and as long as action must be based on pure judgment, chances for error are always present. If prescribed burning is to be used as a tool in silvicultural operations and in reduction of hazard the "methodology of prescribed burning" must be developed.

Conclusions and Summary

Large-scale prescribed burning operations conducted in virgin ponderosa pine stands of the Fort Apache Reservation have produced results of sufficient significance to warrant the present discussion and considerable future study. Reduction in fire hazard has been of particular significance. On the prescribed burn areas numerous hot, damaging wild fires, started almost entirely by lightning, burned over many hundreds of acres during the last three fire seasons previous to treatment. In contrast during the 1951 fire season of almost unprecedented hazard and danger, following treatment, it was necessary to control only eight light fires that burned a total area of 4 acres. Significant harmful results, such as accelerated soil erosion, have not been observed. It is believed the thinning of dense reproduction stands will prove beneficial. Burning operations should be given considerably more intensive study by research organizations so that a "methodology of prescribed burning" can be established.

The writer recommends that prescribed burning tests in ponderosa pine be continued, since they appear to be based on sound ecological concepts.

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A Wilderness Laboratory in Northern Minnesota

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The Quetico-Superior Wilderness Research Center, a private project designed for the advancement of the ecological sciences with emphasis on wilderness problems and values, has been in process of development since 1937, and under scientific direction since 1949. Located on Basswood Lake, in the Superior National Forest of Minnesota, the station is at the southern edge of Quetico Provincial Park Ontario (Fig. 1). Included within the international area in which the center is located are about several million acres of forested lakeland, much of which retains its original wilderness character. The surrounding United States territory, which was cut over between 1885 and 1915 (except for isolated areas, in one of which the buildings are placed), has not been materially disturbed by man during the intervening years, except as to fish and wildlife.

The research center is operated under the informal supervision of a committee of scientists designated by the Universities of Minnesota and Toronto, and the U. S. Forest Service. Because of the limited resources of men, money, and materials, effort is concentrated on projects which give the most promise of constructive accomplishment. However, facilities are offered to all scientists who can be assisted in work of public interest.

The project is privately financed by an individual who believes that primitive environment is valuable for the physical, mental, and spiritual health of people. His numerous canoe trips through the region since 1919 helped create the desire to perpetuate the wilderness and to study its many aspects. He believes that as a people our balance, perspective, and sense of values can best be preserved by acquiring knowledge of the elemental problems of existence, and that personal contact with wilderness country is a concomitant to this end.

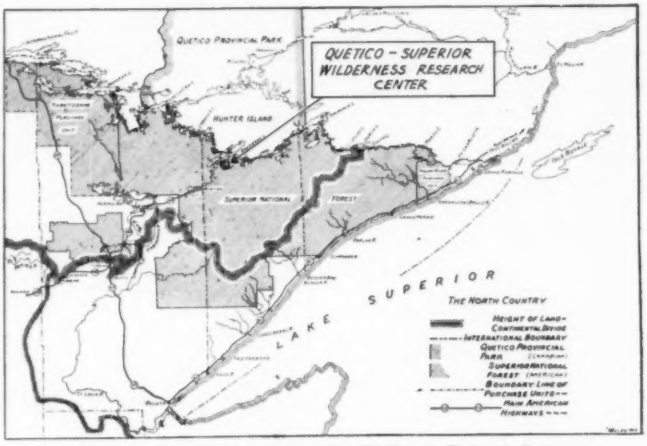

FIG. 1.—Location of Quetico-Superior Wilderness Research Center.

Because scientists have not acquired enough of the basic technical knowledge of wilderness to be able to deal confidently with the many problems of its perpetuation, more fundamental studies in botany, entomology, fish and wildlife, forestry, and allied sciences are needed if this knowledge is to become available before it is too late. At this research center a modest attempt is made to provide assistance in gathering that information.

Staffed by technical and skilled labor and serviced for year-round occupancy, the center's buildings include a carpentry and machine shop, offices, and dining and sleeping quarters. The research building (Fig. 2) is equipped with microscopes, balances, elementary chemical equipment, camera and darkroom facilities, a small library, an herbarium of the region, entomological supplies, and the ordinary equipment necessary to manage a forest plantation. Materials, such as lumber and hardware, and equipment, such as canoes and camping gear, are available. Expeditions may thus be undertaken into the remote parts of the area. A graduate forester is in charge.

Research Projects

The forest plantation, largely of indigenous coniferous species, consists of about 165,000 trees planted in annual increments since 1938, and provides living material for continuous studies which may eventually have value in forestry. Comprehensive records of plantings seed sources, and amounts and causes of mortality have been kept for the past four years.

Among the research projects carried on by the station are studies concerning both practical forest management problems and basic ecological conditions. In forest management, various techniques for the control of undesired brush and insect species have been tried, and studies of the rate and type of brush invasion into various timber stands have been initiated. There are several projects concerned with the study and control of white pine blister rust, and the development of rust-resistant stock. Seedlings of important timber trees acquired from seed sources within and without the state have been planted, and observations made on their growth and survival under northern Minnesota conditions. A considerable amount of time has been devoted to thinning and growth

studies on second-growth Norway pine. The utilization of black ash as a forest product is also being studied.

Extensive botanical and entomological collections and classifications have been made. The station herbarium contains about 2,000 plants of the area, representing 94 families and more than 500 species. Phenological observations of 20 tree species, the effects of floods on various conifers, factors affecting the growth of wild rice, and vegetational succession studies in upland and swamp areas are other projects that are being conducted. Daily weather records, including air and water temperatures, precipitation, and lake levels are maintained.

In regard to the wildlife of the region, research projects have been initiated concerning small mammal populations on several islands of Basswood Lake, effects of the feeding habits of deer and rabbits on vegetation, and a preliminary bird population study.

Because many of the projects are of long-term nature, conclusive results cannot be expected for some time. However on several of the studies mentioned, such as the effect of flood on conifers, the wild rice study, and chemical eradication of brush, there are evident certain trends which merit brief discussion.

Effect of Flood

An unusually high flood in the Basswood Lake watershed in the spring of 1950 provided an excellent opportunity to observe the effects of submergence on forest tree species. Representative samples of flooded trees were tagged, photographed, and information regarding depth, period of submergence, growth, and condition was recorded. Observations of the same trees and unflooded check trees were made in 1951.

Among the larger size classes, it was noted that balsam fir suffered heavier mortality than any other conifer, and that among the hardwoods, paper birch was most affected. This result occurred in all localities where the species was present. Trends in other species and size classes varied from place to place.

FIG. 2.—Laboratory and headquarters building.

Species differed in the degree to which their foliage was affected by submergence. For the smaller size classes, white spruce, white pine, jack pine, and Norway pine suffered complete mortality of submerged foliage, whereas black spruce and balsam fir showed little damage. Larger size classes generally had relatively little foliage exposed to the flood. It was noted that there was an abnormal number of needles per fascicle on the submerged portions of some of the young white pine. The range ran from 3 to 9 needles per fascicle, the normal number for white pine being 5. Following the flood, most of the recovered foliage on white pine and Norway pine showed a pale green color and was shorter than normal. White spruce showed the same conditions, but to a lesser degree.

Wild Rice Study

An investigation of the conditions affecting the growth of wild rice (*Zizania aquatica* var. *angustifolia* Hitchc.) was made in 1950 and 1951 in portions of Basswood Lake and other nearby bodies of water. Air and water temperatures, depths, types of bottom, and plant associates were noted, with emphasis being placed on the effects of various depths and water level changes on the rice. Rafts and other apparatus were constructed for the experimental determination of the latter.

Results, in general, indicate that the plants at lesser depths (approximately two feet) developed earlier and grew more vigorously than those at greater depths (approximately four feet). For plants starting at a given depth, the effect of decreasing water levels in the early growth stages, which seem to be the most sensitive to change, was to promote development of the rice, while increasing water levels generally retarded development.

Chemical Brush Control

In chemical eradication of brush, particular attention has been devoted to the elimination of *Ribes* spp., alternate host plants of the white pine blister rust. The two prevalent *Ribes* species in northeastern Minnesota are the swamp red currant, *R. triste*, and the northern smooth gooseberry, *R. hirtellum*. The swamp red currant has an extensive underground stem system and unusual regenerative ability to layer and produce new sprouts. Since mechanical eradication of this species is extremely difficult and often results in excessive resprouting, efforts were made to find an effective and economical herbicide.

Two types of applications, foliage spray and stub treatments after decapitation, were made in mid-June, early growing season for this region. Chemicals used were 2-4-5-T and 2-4-D, alone and in 50-50 mixture. Concentrations were 9,000, 12,000, 15,000, and 24,000 parts per million, in an aqueous solution for the foliage sprays, and in a No. 2 fuel oil base for the stub

FIG. 3.—Mature virgin white pine.

treatments. Effectiveness of kill was determined by carefully uprooting all treated bushes for tissue examination to determine if live sprouts were connected to the treated bushes.

On the basis of the results of this study, the most effective and practical chemical treatment for the two *Ribes* species is 2-4-5-T foliage spray applied in the early part of the growing season in concentration of 12,000 p.p.m. water solution. Although effective results were obtained in some of the stub treatments, the added labor costs over foliage spraying do not justify it in a practical field eradication program. Stub treatment might have merit if used to supplement mechanical eradication of troublesome bushes.

Opportunities Ahead

Status of most of the work being done at the station is available for examination in annual station progress reports and technical notes. Information from some of the studies has been incorporated in other publications, and some is presently being developed into doctoral and master's theses at the University of Minnesota, as a result of work done at the center by graduate students.

For the future, certain of the foregoing projects are being expanded in scope and detail. Plans are being made for new studies concerning forest succession and its relation to aesthetic and recreational values and associated management problems, particularly with regard to balsam fir. This species, the supposed climax, is rapidly taking over in many areas, some of which presently contain pine stands of generally more desirable aesthetic and camping values.

In the early phases of development of this station, projects were designed chiefly from the forest management point of view. The present trend is more toward basic wilderness ecology studies. Because of the unique character of the region, one of the last remaining wilderness areas of the country, it is believed that scientific work here can be of significance in adding to our knowledge of wilderness processes and in forming the basis of suitable policies regarding such areas.

Mail may be addressed to the Quetico-Superior Wilderness Research Center either to Ely, Minn., or to 919 North Michigan Avenue, Room 2020, Chicago 11, Ill.

Thinning Yellow-Poplar in Second-Growth Upland Hardwood Stands[1]

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Ten years of records of growth of individual trees and stands are presented here for high and low thinnings of two intensities in 30-year-old stands of yellow-poplar and associated species. Conclusions drawn at this time apply only to cordwood production and may be subject to different interpretation later when board-foot volumes can be measured and evaluated.

THINNING is one of the measures for controlling growing stock so as to meet the objective of management, whether it be maximum volume of specific products, maximum value production, or maximum rate of return on invested capital. By modifying structure and composition of stands, timber-stand-improvement measures such as thinning can make or break a production schedule. Stand improvement is achieved through both intermediate and later cuts.

Specifically, the silvicultural benefits of thinning are three: (1) to reduce the time needed to produce forest products, (2) to increase the total harvest, and (3) to augment the quality of yields.

Total harvest can be increased partly through accelerated growth on selected stems, and partly through early salvage of merchantable individuals otherwise destined to die before harvest time. As for quality, it is enhanced when the full productive power of the soil is concentrated on selected trees of desirable species or superior stem form, preferably both. These are known principles—acceptable without further research. Doubtless one or more of the effects mentioned result from almost any thinning. There is more doubt concerning the best methods and the skill with which they are applied. Hence the specific or full benefits sought are seldom realized. This article is the first report of progress from a study designed to reveal the more effective methods of thinning.

[1]This article is based on sample plots established in 1939 by Jesse H. Buell. Statistical analyses were contributed by Thomas C. Evans. A report on another phase of this study has been published by the author (*9*).

Theoretical Features

Successful thinning improves the space arrangement of crowns on the more desirable stems. The method to use is the one best suited to local stand conditions, tree species, sites, and objects of management. Three main methods are used in commercial thinnings, low, high, and selection. The last takes out trees from both high and low levels, and is an outgrowth of a European procedure known as the Borggreve method. There is no single best method; there is always a preferable one for the purpose sought.

In a *low* thinning, marking starts at a low level and proceeds toward a higher crown level. It provides a direct means of avoiding mortality where it is normally heavy—among the smallest trees. It tends to maintain a single story and serves also to eliminate deformed stems early, but rough stems—if present among the largest trees—are left to usurp more and more space. Another disadvantage is that the small trees removed are expensive to handle, have little sale value, and may not pay for the cost of treatment.

In a *high* thinning, marking starts at a high level and proceeds downward but seldom enters the understory. It does not necessarily take the largest trees; it does remove the least promising and excess trees in the upper crown class. The opportunity for selection of crop trees is better when operating in an overstory. The tendency may be to maintain a two-storied stand, but objections to this method are few where markets provide an outlet for trees to be cut.

Selection thinning resembles high thinning enough to share some advantages. It always takes the larger trees, removing any "wolfish," and poorly formed dominants incapable of satisfactory value increment. Suppressed understory trees that are big enough may be cut or may be tolerated because they offer no serious competition. Some of the smaller ones may live long enough to provide pulpwood. An object is to release intermediate trees to grow into the upper crown classes. Intensive repetition of this kind of cutting steps up quality of product. Its proponents claim that the residual stand plus successive thinnings provide a maximum realization value.

A disadvantage may be some reduction in volume yields, increase in length of rotation, or both. Small trees reserved may be injured by the felling of large ones or may obstruct their removal. Harvesting the biggest trees in an even-aged stand could deplete a stand of the most rapid growing individuals which are the potential parents of the next generation of trees. The selection method is used by the Danes in stands composed exclusively of superior strains (*1, 5, 11*).

The Experiment

A series of permanent sample plots was laid out in 1938 on the Fernow Experimental Forest in West Virginia.

Two degrees and two kinds of thinning are there compared with unthinned control plots in five separate treatments. The degree of cutting was *none*, *moderate*, or *heavy*,[2] and the kind was *high* or

[2]Light, *Grade A*, thinnings were not tried because they have been generally disappointing in both European and American practice. Avoiding both light and extremely heavy cutting, the treatments tested here correspond to Hawley's (*2*) grades "B" *moderate*, and "C" *heavy* thinning. The more severe *Grade D* thinning and the very heavy *Grade E* "accretion cutting" logically come later when regeneration is desired. Less appropriate as intermediate cuts, they are more useful as a prelude to final harvest. Grades D and E resemble reproduction cuttings in the shelterwood system.

low. Combinations of these methods constitute the four thinning treatments tested. So far there has been only one thinning.

Choice of a method to use can be guided by experimental results showing volumes of wood taken out, amounts restored, the growth percent, and the quality of products cut and trees left. Hence the results of the five treatments are here compared in respect to: (1) starting conditions—immediate effects, such as breakage loss, and stocks left to grow; (2) yields at 10 years—amounts cut and grown, and (3) future prospects as indicated by growth in relation to stand elements to be favored in management for specific products.

Starting Conditions and Immediate Effects

The forest consisted of yellow-poplar, *Liriodendron tulipifera L.*, with a typical admixture of other upland hardwood species. The site was of good timber-growing quality, index 85 ± 1.4. Yellow-poplar 29 to 24 years old was most abundant and provided 30 to 80 square feet of basal area per acre. The associate species were present in decreasing order as follows: basswood, black birch, cucumber, black cherry, northern red[2] oak, sugar maple, yellow birch, and white ash. Most of the less abundant additional species represented were of inferior commercial value. In descending order of frequency they were beech, red maple, black locust, hickory butternut, hemlock, aspen, hophornbeam, white oak, chestnut oak, serviceberry, blue beech, dogwood, witchhazel, sassafras, and fire cherry.

The forest possessed the usual irregularities of second growth including remnants of old growth. The basal area of holdover trees, 13 inches d.b.h. and larger, varied from 0 to 35 square feet per acre. They were removed from all 24 of the 0.4-acre plots installed. Eight of these plots were kept as unthinned checks. Each of the 16 test plots were then thinned. This operation followed the usual procedure in reserving the better trees and designating others for removal. Non-pulping species were cut for firewood. Pulp trees were not cut unless they would yield at least two sticks. Of the 16 plots 8 were thinned heavily and 8 moderately. Each group of 8 included 4 plots marked from above ("crown thinning") and 4 from below ("low thinning"). This design provided a contrast in thinning intensity and an independent comparison of method within each intensity. The effect on initial growing stock is shown in Table 1. The figures indicate that the plots to be thinned from below happened to have a greater average starting volume than those thinned from above. However, the former were cut more heavily, with the result that the growing stocks left were more nearly equal. In terms of percentage of basal areas removed, the heavy thinning took about twice as much as the moderate one. While marking from below removed a higher percentage of the trees than did the marking from above, the proportion of volume removed was nearly the same for the two methods.

The control areas were not wholly without cutting. Though these plots were unthinned, the removal of hold-over trees eliminated undesirable irregularities and furnished some additional space for development of young growth. A larger number of trees and greater volumes were cut from each thinned plot. These were distributed among the treatments as shown in Table 2. In heavy thinning from above, 10 percent of trees removed were cut because they were broken in felling marked trees. The other treatments broke only 5 percent of the trees. In practice some allow-

TABLE 1.—PORTION OF GROWING STOCK REMOVED IN TREATMENT AND VOLUME LEFT (1939)

Trees of cordwood size[1] per acre	Unit	Check Unthinned[2]	Moderate Above	Moderate Below	Heavy Above	Heavy Below
Original stock in 1938						
Stand	Trees	261	274	265	243	270
Basal area	Sq. ft.	94	85	94	94	100
Volume	Cu. ft.	2,239	1,692	2,159	1,640	2,258
Removed in 1939[3]						
Stand	Percent	7	14	29	42	67
Basal area	Percent	21	31	37	65	66
Volume	Percent	11	16	22	52	55
Left to grow	Cu. ft.	1,993	1,421	1,684	787	1,016
Basis in 0.4-acre test plots	Acres	3.2	1.6	1.6	1.6	1.6

[1]4.5 inches d.b.h. and larger, i.e. 3- and 4-inch saplings excluded.
[2]Although check plots were not thinned, their opportunity for growth was enhanced by removal of residual old-growth trees.
[3]Includes holdovers removed, thinnings, and trees broken by felling others, in percent of original stock in 1938.

TABLE 2.—TREES AND VOLUMES CUT BY TREATMENTS[1]

Extent and class of cut	Check unthinned	Moderate Above	Moderate Below	Heavy Above	Heavy Below
		Trees per acre			
Number cut	18	38	77	102	181
		Percent of cut			
Their distribution					
Holdovers taken	78	32	15	15	10
Thinnings	None	63	80	75	85
Mortality (broken)	22	5	5	10	5
Total	100	100	100	100	100
		Cubic feet per acre			
Amount cut	246	271	475	853	1,242
		Percent of cut			
Its distribution					
Holdovers taken	89	44	83	59	35
Thinnings	None	52	11	35	60
Mortality (broken)	11	4	6	6	5
Total	100	100	100	100	100

[1]Trees 4.5 inches d.b.h. and larger.

TABLE 3.—VOLUME OF STOCK, ITS 10-YEAR GROWTH, AND AVERAGE ANNUAL YIELD PER ACRE[1] FROM THINNING TREATMENTS

Stock, growth, and yield	Check Unthinned	Moderate Above	Moderate Below	Heavy Above	Heavy Below
			Cubic feet		
Growing stock volume					
Original stock in 1938	2,239	1,692	2,159	1,640	2,258
Left after cut 1939	1,993	1,421	1,684	787	1,016
On hand in 1949	3,150	2,595	2,798	1,701	1,906
Yield in ten years					
From growth	1,157	1,174	1,114	914	890
From initial cut	246	271	475	853	1,242
Total	1,403	1,445	1,589	1,767	2,132
Average annual yield	140	145	159	177	213
			Percent		
Proportionate yields[2]					
From growth	5.8	8.3	6.6	11.6	8.8
From cut plus growth	6.3	8.5	7.4	10.8	9.4

[1]Contents of all trees 4.5 inches in d.b.h. or larger, to a 4-inch outside-bark top diameter by Schnur's tables for upland hardwoods (7).
[2]Periodic annual growth percent based on stock left 1939; cut-plus-growth percent based on original stocking before thinning as shown in line 1.

ance must be made for incidental destruction of this kind, especially in the removal of wolf and holdover trees, but no treatment that cuts or breaks down too many small trees is advisable, because the saplings may have to supply the recruits for future stocks.

Timber Cut and Grown in Ten Years

The yield of merchantable wood in the first decade following five treatments is shown in Table 3.

Two to three times as much wood was deliberately harvested in heavy as in moderate thinning (see line 5 of Table 3). If, for the moment, the inequality of the initial "take" be disregarded, considering only the subsequent 10-year volume-growth, the two heavy thinnings were both inferior (see line 4, Table 3). On the same basis it appears best to thin only moderately or not at all (between these two treatments there was no significant cubic-foot difference in growth). The short-term volume increment was best from treatment reserving the largest quantities of growing stock per acre. Timber growers, however, rightly appreciate an opportunity to obtain intermediate yields as early as possible, and may be loath to thin only moderately if such a cutting leaves too high an investment in wood capital.

The highest growth percents are obtainable from the smallest trees and lightest stands, but such percents have little meaning when considered without respect to investment in land, costs of management, and level of growth in units of volume or value per acre. Too often a high percentage of wood growth means only the temporary scarcity of wood capital in tree sizes suitable for commercial production.

The difference in basal-area yield in favor of thinning was significant either with or without the basal area of holdovers cut. Comparable analysis failed to reveal any significant difference in basal-area yields associated with the severity or method of cutting.

The current average yields in merchantable cubic feet (Table 3) show the combined effect of volumes cut and grown. If both the 10-year growth and the initial cut are thus included in the yield, all four methods of thinning appear beneficial, but it so far seems best to thin heavily from below (see data in lines 6 or 7 of Table 3). The weakness here is that after only 10 years the preference is in favor of the treatment that arbitrarily extracted the heaviest cut. It tends to mask the possibility that growth after thinning from below may have been somewhat reduced by the heavier cut. Wood-yield percentage figures (see last two lines of Table 3) suggest thinning heavily from above rather than from below. The results from the second decade will be more helpful and may modify the inferences drawn here. Meanwhile the effect of stand density on current diameter growth and of thinning on stand character deserves consideration.

Relation of Stand Density to Growth of Potential Crop Trees

The diameter increment of those individual yellow-poplars that survive 10 years decreases steadily and directly with increase in the density of the stand that surrounds them. The increment of individual trees in all crown classes except suppressed was studied on temporary plots within the permanent plots. On each of 192 circular 0.07-acre plots (radius 31.2 feet) with a sample yellow-poplar at the center, all trees 1 inch in d.b.h. and larger were measured. The current average diameter growth of the sample trees was then plotted over the average density of the competing stand in 1949.[3] This gave the regression curve and formula of Figure 1. Within the range of densities observed, these relations are strictly linear.

Rhododendron and laurel were absent on these 192 plots. On 46 other plots these Ericaceous shrubs formed an understory 10 to 15 feet high. Here a similar analysis of the growth of yellow-poplar sample trees (all classes except suppressed) produced a similar curve that is slightly (i.e. about 0.1 inch) but not significantly lower. The corresponding loss in periodic annual volume growth is small, amounting in this instance to about 0.29 cubic feet per tree or 8 to 10 cubic feet per acre. In view of this insignificant retardation of crop trees by a heavy understory, the expense of removing rhododendron is best deferred until final harvest. It can be more economically handled then as a blanket measure and as a more timely one in promoting regeneration of desirable species.

The design of this study does not show whether the slightly slower

[3]The stand density index, or S.D.I., used as the independent variable in this analysis is based on Reineke's principle (6) as used in Schnur's formula: Log number of trees = 3.864 — 1.4987 log of average d.b.h. for the upland mixed oak type in the East (7).

growth of trees in the presence of rhododendron is due to the understory or whether both the presence of the bushes and the slower growth rate have a common cause in some soil condition or site factor. Records over two years at the Coweeta Hydrologic Laboratory, however, show that the elimination of a rhododendron and laurel understory resulted in an annual increase of 3.64 acre-inches of run off, amounting to over 10 percent of the annual rainfall. This suggests that during a drought a heavy understory may deprive a timber stand of water needed to sustain growth.

A corresponding minor reduction in growth in *stand* volume is undoubtedly associated with heavy rhododendron underbrush, but here the relation of growth to stand density is curvilinear. The growth of stands follows a different course because it is normally affected not only by additions through "ingrowth" but also by subtractions through mortality. Increased volume growth does not accompany decreased stand density beyond a certain optimum range of stocking, S.D.I. 200 to 240. The trend of current volume growth of a stand reaches a maximum for certain favorable densities, wherein the d.b.h. growth of yellow-poplars is roughly 2 inches in 10 years.

Thinning in Relation to Stand Characteristics

The net effect of thinning on various stand characteristics is shown in Table 4. The data on basal area reveal no statistically significant differences. They suggest that all thinnings increased growth slightly with minor differences between treatments. Diameter increase in a tree of average basal area was greatest on the check plots (Table 4). This, however, is ascribed in part to the mechanical increase in average diameter owing to the loss of 66 trees—a relatively heavy mortality of small stems on unthinned check plots. Mortality was less after thinning moderately from above, but 19 trees were lost, probably because this method fails

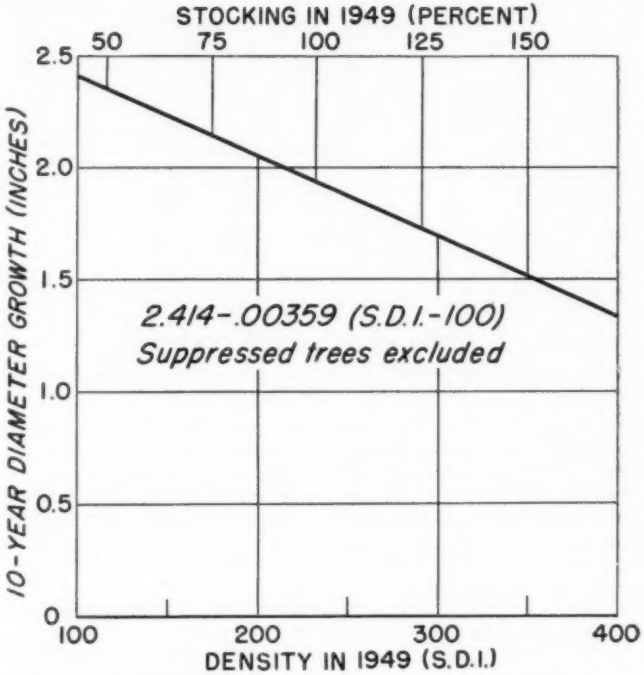

FIG. 1.—In undisturbed stands, or between successive cuts in thinned stands, the average current growth of individual yellow-poplars decreases directly with increasing density of stand as shown. By contrast, up to a point, volume growth of the stand tends simultaneously to increase. See Figure 2.

TABLE 4.—NET EFFECT OF 10 YEARS' GROWTH ON STAND PER ACRE, AVERAGE SIZE AND SPACING OF TREES, AND DENSITY OF GROWING STOCK

Trees and saplings[1]	Check unthinned	Moderate		Heavy	
		Above	Below	Above	Below
			Stems		
Stand					
1939	503	506	410	311	258
Change	− 60	− 15	+ 12	+ 59	+ 57
1949	443	491	422	370	315
			Square feet		
Basal area					
1939	93	79	75	45	46
Change	+ 30	+ 33	+ 34	+ 31	+ 32
1949	123	112	109	76	78
			Inches		
Diameter average tree					
1939	5.8	5.4	5.8	6.1	5.7
Change	+ 1.3	+ 1.1	+ 1.1	+ 0.9	+ 1.0
1949	7.1	6.5	6.9	5.2	6.7
			Feet		
Distance between trees					
1939	9.3	9.3	10.3	11.8	13.0
Change	+ 0.6	+ 0.1	− 0.2	− 1.0	− 1.2
1949	9.9	9.4	10.1	10.8	11.8
			Index[2]		
Stand density					
1939	224	198	180	115	111
Change	41	+ 59	+ 62	+ 24	+ 62
1949	265	257	242	139	173

[1]Stems 2.5 inches d.b.h. and larger. The 1939 figures are from measurements after thinning that year. Changes are net effects of ingrowth (new stems), accretion (larger stems), and, on the check plots, mortality (lost stems).

[2]Reineke's S.D.I. as used here are averages for all 0.4-acre plots in each treatment. Literally each index denotes the number of trees per acre a stand of that density will have when the average diameter of the trees reaches 10 inches.

to improve spacing among small trees. Heavy treatments, by providing growing space for saplings, added to the numbers of 2.5-inch and larger trees, the net increase being five times as great after both heavy thinnings as after thinning moderately from below.

Some thinning to reduce stand density was worth while, judging by the data on number or size of stems, but the differences in neither severity nor direction of thinning were significant. In fact, by means of none of the usual criteria (i.e. changes in number of stems, basal area, or volume), could any statistical significance be attached to the small differences associated with thinning from above versus from below.

When the amount and kind of thinning is disregarded, the relation of the annual volume growth on these plots to the initial stands can be shown as curves. Then the maximum growth, about 115 cubic feet, developed from stands of about 1,500 cubic feet, S.D.I. 220, and basal area 95[4] (Fig. 2). These peaks suggest that those interested in maximum cubic volume production should thin moderately.

Stocks reduced by thinning are often restored or even increased in the next 10 years, especially those with a well established understory. In that case ingrowth as well as stem enlargement adds to the total. The narrowing of the spacing between 1939 and 1949 on the more heavily cut plots is due mainly to ingrowth.

The spacing after the thinning in 1939 can be approximated by the use of rules of thumb which relate the average distance in feet between stems 4.5 inches in d.b.h. and larger to average diameter (D) in inches. The check plots were spaced at 1.7 D. Moderate thinning extended this to 1.9 or 2.0 D and heavy thinning to 2.5 D.

Wilson (*10*) proposes that space requirements be related to tree height. This is theoretically preferable, but more difficult in practice. On the thinned plots in 1939 the average space between all trees 2.5 inches and larger varied from 14 to 26 percent of the height of dominant yellow-poplars. With understocked plots included, the 10-year annual volume growth per acre decreased roughly as follows with increased space between trees:

Growth=135−5 (f−14)±13.6 cubic feet

where f = spacing in terms of percentage of average height of dominant yellow-poplar. The standard error of 13.6 cubic feet seems somewhat high. Growth can be estimated a little more closely from the relationships shown in Figure 2. Comparable standard errors of estimates of growth from these curves are 12.6 for the volume base, 11.7 for basal area, and 11.5 for S.D.I.

Thinning in Relation to Tree Classes

The trees composing an upland hardwood type to be thinned may be classified on the basis of commercial importance, shade tolerance, or size.

In this instance the more valuable species are also the larger, dominant, and relatively intolerant ones. Based on the number of cubic feet grown per square foot of stock left following any given treatment, the major intolerant species grew two to three times as fast as did the minor and more tolerant ones. To favor the more important species, in this situation a heavy thinning from above is indicated as desirable. The effect of thinning on composite diameter-growth of all species was analyzed graphically by Dwight's confrequency method (*8*). It showed the average 10-year diameter increment of most diameter classes between 6 and 14 inches on unthinned plots to be exceeded by about 0.2 inch under moderate thinning and 0.5 inch under heavy thinning; these are moderate increases. But a heavy thinning from either above or below may have very striking effect in accelerating diameter growth of certain crowded tree classes. The 7- and 8-inch yellow-poplars of intermediate crown class illustrate this effect. Their average periodic growth was stepped up from 59 to 210 percent. Response to thinning hinges on which size class was the more crowded and which the more completely freed from the competition of its neighbors. Hence an owner's choice of method can and should be influenced by both stand congestion and the tree size he wishes most to favor.

For good production of quality products, neither the growth per tree nor the growth per acre need equal the maximum rate. Some intermediate rate of volume growth can lead to maximum increment in

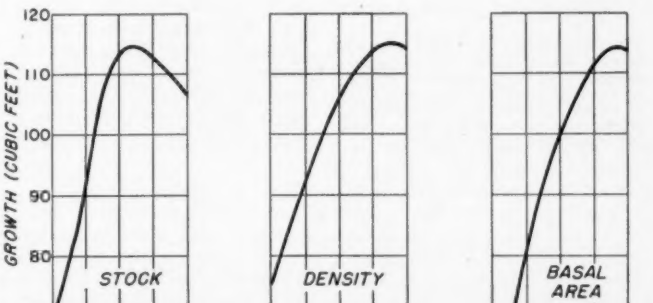

FIG. 2.—Effect of growing stock left in 1939 on annual volume increment per acre in the next 10-year period. Note approximate stocking associated with maximum growth.

[4]Intensive application of selection thinning in young coniferous stands in Denmark aims at a basal area of 80 square feet per acre (*5, 11*). With very tolerant hardwoods, however, the level of stock compatible with maximum annual increment is apparently higher. For example the greatest growth in basal area of beech has been maintained in stands of 100 to 150 square feet per acre (*4*).

value of products. To reach this goal in mixed stands, it is essential to improve species composition in the thinning process. Thus improved, the thinned plots will eventually yield greater average values per unit of volume.

Conclusion

A single thinning in young yellow-poplar stands increased current yields slightly but perceptibly over a 10-year period. A program of heavy thinning will hasten intermediate returns and accelerate the development of favored trees without necessarily increasing total yields over a long period any more than would a series of lighter cuttings. Moderate thinning induces less epicormic sprouting than heavy cutting, and, if used at relatively short intervals, may be just as effective. Thinning may augment ultimate volume yields mostly through salvage of trees that would otherwise die of suppression. In these tests two degrees and two methods of cutting have not so far had any appreciably different effects on gross yields from zero age to date, including thinnings.[5]

Quality can be increased through selection while marking the cut. Already in this experiment, by favoring the better individuals and species, all thinned stands are definitely improved in stem quality and composition. Increased value increment will follow in future years.

Although the 10-year average diameter growth of all reserved trees was increased only 0.2 inch by moderate and 0.5 inch by heavy thinning, the corresponding increases ranged up to 2.0 inches for one prevalent and promising class of tree, the 8-inch yellow-poplars with intermediate crown development. The diameter growth of individual crop trees declines directly with increases in stand density of neighboring trees that crowd them. While this decline can readily be checked through judicious thinnings, the volume growth per acre will be adversely affected if the thinnings are too heavy or too frequent. Densities optimum for good management appear more important than the method of thinning used in attaining these densities. On the plots observed in the present study the highest current growth in volume was found where the initial density ranged from S.D.I. 200 to 240. Although the highest total yield so far (one thinning plus 10 years' growth) occurred where the initial density ranged from 84 to 140, the total yield after several well timed thinnings in the life of the stand may eventually be about the same for all of the densities.

In the tests to date there is no clear quantitative evidence favoring marking a thinning from above instead of from below as a fixed principle. Rather, the indication is that this choice should be based on observation of the elevation within the forest canopy where desirable stand elements are most congested. Abnormally short, living crowns on prospective crop trees indicate clearly the place as well as approximately the time when thinning is most needed (*3*). Thus, choice of method should be based on the need for release of those tree-size classes capable of, and scheduled for, the production of desired products. the selection method of thinning was not tested in this study. But since the tested extremes of thinning only from above and below show little difference so far, it is logical to infer that the more flexible selection method is best.

[5]Concerning the relationships of growth to stand density, the data presented here are subject to the limitations of a single set of plots on one site. A broader study is needed to determine the relation of growth rate to stand density, age, and site in managed or thinned stands.

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Compression Failures in the Boles of Living Conifers

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WHEN COMPRESSION FAILURES are noticed in lumber at the sawmill, the defect is usually attributed to careless felling or rough handling in logging operations. Yet compression failures also occur in the boles of living trees. The existence of such failures is not generally recognized by foresters, and the subject has seldom been mentioned in American forestry literature. In this paper we shall summarize previous investigations, describe a clear instance of compression failure in living eastern white pine (*Pinus strobus* L.), and consider the silvicultural implications of the phenomenon.

The compression failures discussed here are injuries involving only part of the cross section of the living stem. Such limited failures are possible because normal wood is much stronger in tension than in compression. When green wood is bent, failure in compression usually precedes failure in tension. Therefore, compression failure can occur in a living stem without complete breakage, provided that the force imposed by a snow load or by wind is great enough to cause failure in compression, but not sufficient to cause failure in tension.

Previous Investigations

In 1914 Markwardt (*4*) first reported an unequivocal case of compression failure in the bole of a living tree. He tentatively attributed the failure to a storm which occurred about 1898. The first European discussion of a similar injury was published in 1925 by a Swiss forester, von Greyerz (*3*), who described pronounced ridges or swellings on one side of the trunks of silver fir. Under these ridges, spaced 12 to 16 inches apart, he found well-defined failures extending to the center of the stem. Von Greyerz inferred that the injuries were compression failures, on the leeward side of the stem. He also noted a rupture of the cambium and the subsequent formation of wider growth layers over the lines of failure. Hans Burger, another Swiss, later presented similar conclusions (*2*).

The swellings associated with compression failures are usually separate from each other, extending diagonally around a portion of the stem. In a case reported by Tregubov (*5*), however, spruce and pine growing on a hilltop in the Dinaric Alps exhibited ridges arranged in the form of St. Andrew's crosses. Tregubov ascribed these ridges to an alternating compression of the stem in two directions, as a result of twisting by winds. Trees exposed to strong winds from only one side showed ridges running in one direction only.

Trendelenburg has made the most detailed investigations of the wood formed over natural compression failures. In 1936 he described (*6*) a stand of Norway spruce (*Picea Abies* (L.) Karst.) in Württemburg, Germany, which had been damaged by a storm in 1930. Compression failures often extended to the center of the stem and occasionally involved more than two-thirds of the cross section. During the spring of 1931, a somewhat broader growth layer began to form around the injured portion of the stem, whereas growth on the uninjured side was almost suspended. Subsequent growth layers over the failure were particularly broad, forming a rounded ridge.

In a later study (*7*), Trendelenburg investigated the nature of the wound tissue more closely. He found that pronounced compression wood had formed between the ridges on the injured side of the tree, even though the stem remained vertical. Small green samples of this compression wood and of the wood from adjacent ridges were tested in compression parallel to the grain. The compression wood proved superior in modulus of electricity, fiber stress at proportional limit, maximum crushing strength, and work to proportional limit. On the other hand, wood from the ridges showed a remarkable ability to recover from deformation beyond the proportional limit, together with greater plasticity and work to maximum load. This unusual combination of properties permits the wood of the ridge to withstand abnormal deformation as it develops and, eventually, to restore the original strength and rigidity of the stem.

Swellings or ridges and associated compression wood are usually limited to the injured segment of the stem. However, Trendelenburg (*7*) reported an exceptional case in which the cambium of a Norway spruce was extensively torn near the compression failure. The tree responded by forming a layer of compression wood on the *windward* side, with a typical swelling at the level of the failure.

Compression Failures in Eastern White Pine

In 1945 H. J. Lutz noticed pronounced ridges on the trunks of eastern white pine growing in the Yale Forest near Keene, N. H. These ridges extended diagonally around the stems for as much as a third of their circumference, protruding from 0.2 to 0.5 inch. Most of the ridges occurred between breast height and the base of the live crown, on the side of the trunk leeward with respect to the 1938 hurricane. Some of the affected trees had been inclined by this storm; otherwise they had suffered no apparent injury.

Figure 1 shows radial sections from a pruned white pine which had grown in a loamy sand on a flat, unprotected site. In 1938 this tree had a d.b.h. of 8 inches and was 42 feet high. The hurricane inclined the tree about 20 degrees from the vertical. Two 8-foot logs

[1]The pine sections described in this article were provided by Professor H. J. Lutz, of the Yale School of Forestry, who suggested and directed this study.

FIG. 1.—Radial sections of an eastern white pine, cut in 1945, showing compression failures caused by the 1938 hurricane. On the right (leeward) side of each section is a layer of compression wood interrupted by swellings along the lines of failure.

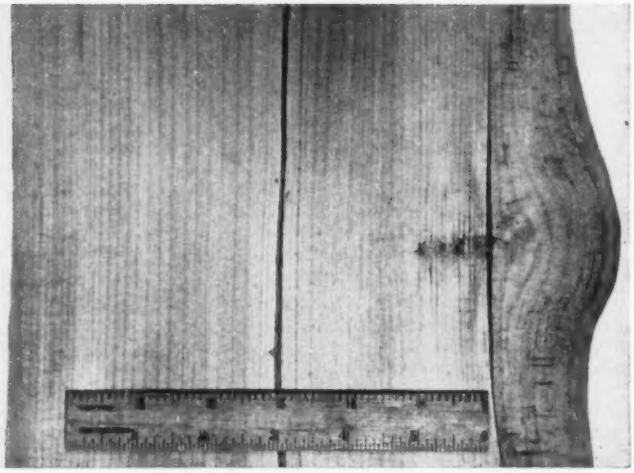

FIG. 2.—A well-defined compression failure, from the right-hand section of Fig. 1. Resin has darkened the outer zone of failure and has filled the cavity between the wood formed in 1938 and the first growth layer of the swelling.

were cut in 1945, and each was sawed through the swellings. The section at the left of Figure 1 is from the butt log; the section from the second log appears at the right. At least one compression failure is visible in each internode above the second branch whorl. The failures are most conspicuous in the outer rings, where resin infiltrated the zone of failure. Covering the failures is a broad layer of compression wood, interrupted by swellings which tend to vary in size with the extent of each injury. In this tree, of course, the layer of compression wood is probably thicker than if the stem had remained vertical.

An enlarged view of part of the right-hand section (Fig. 2) shows a typical failure in greater detail. The bark and cambium evidently separated from the wood during the storm, leaving a long cavity, now filled with resin. A small secondary failure extends about 0.1 inch from the cavity into the 1939 growth layer. This failure must have occurred after the original injury, as a result of moderate winds acting upon a zone of reduced strength. It is evident that the swelling was most pronounced during the period from 1940 to 1943, after which thicker increments on the shoulder of the ridge began to soften its outline. The compression wood between the ridges shows many conspicuous traumatic radial resin ducts. Wood formed on the tension (windward) side of the tree appears normal.

Figure 3 illustrates the distribution of compression failures and associated ridges or swellings in sections from another white pine, split between the 1938 and 1939 growth layers. Most of the lines of failure run at an angle of about 60 degrees with the stem axis.

Silvicultural Implications

Although less common than other types of wind damage, compression failures are not rare. In addition to the examples just described, they have been observed in eastern white pine and red pine (*Pinus resinosa* Ait.) in the Eli Whitney Forest, near New Haven, Conn., and in Norway spruce in the Rainbow Forest Plantations, near Windsor, Conn.

Compression failures are apparently most common in young trees with tall, slightly-tapered stems which are easily whipped by the wind. Dense pole timber stands are particularly subject to this injury if they have recently been thinned. The same factors that predispose trees to wind breakage also make them susceptible to simple compression failures under a less severe stress.

As shown in Figure 1, the ridges or swellings covering most compression failures become pronounced within a few years. Although these diagnostic ridges are gradually obscured, they remain visible for more than a decade. A failure in Sitka spruce (*Picea sitchensis* (Bong.) Carr.) was marked by a swelling for at least 19 years, as estimated from Anderson's photograph (*1*).

A tree which has sustained compression failures is ordinarily undesirable for sawtimber. Boards from the affected part of a log often break during sawing, and the layer of compression wood may

be equally objectionable. An injured tree is also subject to further wind damage. Winds blowing toward its weakened side may later cause complete breakage, characterized by a brash tension failure in the plane of the old compression failure. For these reasons, trees that show ridges indicative of compression failure should usually be removed. In salvage operations following severe windthrow and breakage, one should suspect the presence of compression failures in all slender, tall trees, especially if they are leaning.

Summary

Compression failures in living trees can occur without complete breakage of the stem, provided the force imposed by snow loads or wind is great enough to cause the leeward side of the bole to fail in compression, but not sufficient to cause tension failure on the windward side. Several European foresters have reported this phenomenon in stands of pole-size conifers. This paper reports similar injuries to eastern white pine, red pine, and Norway spruce in New Hampshire and Connecticut.

A zone of compression wood, marked by diagnostic ridges or swellings, usually develops on the injured side of the stem. This process tends to restore the original strength of the stem, but it also increases the cull volume in sawtimber. Moreover, injured trees are susceptible to breakage during later storms. Whenever possible, such trees should be recognized and removed from the stand in salvage cuttings and other operations.

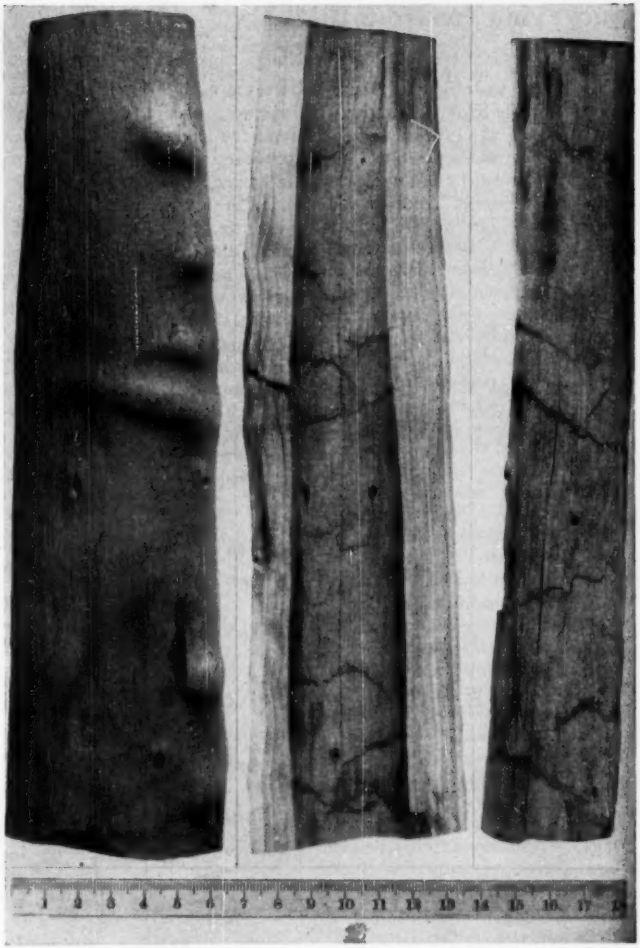

FIG. 3.—Stem sections from another white pine, showing natural compression failures. *Left*: Diagnostic ridges on the stem, with the bark removed. *Center*: Inside view of the same section (the outer shell of compression wood), split between the 1938 and 1939 growth layers. The secondary compression failures mirror the original injuries. *Right*: Core of the stem (1938 growth layer exposed), showing irregular lines of buckled fibers.

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Surveying for Pole Blight

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A DISEASE of undetermined cause, known as "pole blight," is seriously threatening the future commercial stands of western white pine (*Pinus monticola*) in northern Idaho and adjacent Montana and Washington. The disease occurs farther north in Canada and was recently reported on the coast in British Columbia (*4*). The advance symptoms of the disease have been described by various workers (*1, 2, 5*). The blight occurs most frequently in pole-size stands of approximately 40 to 100 years of age and in white pine stands in association with all other important tree species of the region, primarily western larch, western hemlock, western red cedar, and grand fir.

Pole blight was first observed by personnel of the U. S. Forest Service on the Kootenai National Forest, Montana, in 1929. It has attracted intermittent attention of foresters ever since but did not cause serious concern until about 1940. During World War II only limited information on its occurence was obtained, but in 1948 a cooperative study of the disease was initiated by the Forest Service; the Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine; the Division of Forest Pathology, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture; and the School of Forestry, University of Idaho. One phase of the work undertaken by the Division of Forest Pathology was to determine the range of the disease and the acreage affected.

Survey Methods

A survey was initiated in 1949 to determine the southern limits of pole blight. Airplanes, flown at low elevations, were used to locate pole-blighted areas. Detailed inspections were later made by ground crews. It was found at that time that the characteristic yellow tops of blighted trees and the shortness of needles and of terminal growth could be readily observed from the air. The aerial observations were made at 250 to 500 feet above the tree tops and the drainages were systematically flown on the contour, with drops down the slope for several successive tours when necessary. The results of this initial air survey have been described by Fowler (*3*). Extensive surveys were made along similar lines in 1950 and 1951.

Most pole-sized white pine stands were thus inspected in 1950, with the exception of several large areas on the Kootenai and Cabinet National Forests in western Montana, which were scouted in 1951. Those areas where the disease was sufficiently prevalent to be seen from the air were visited by ground crews for closer observation and verification.

In determining the presence or absence of pole blight on the ground, the rating system described by Buchanan and associates (*2*) was used.

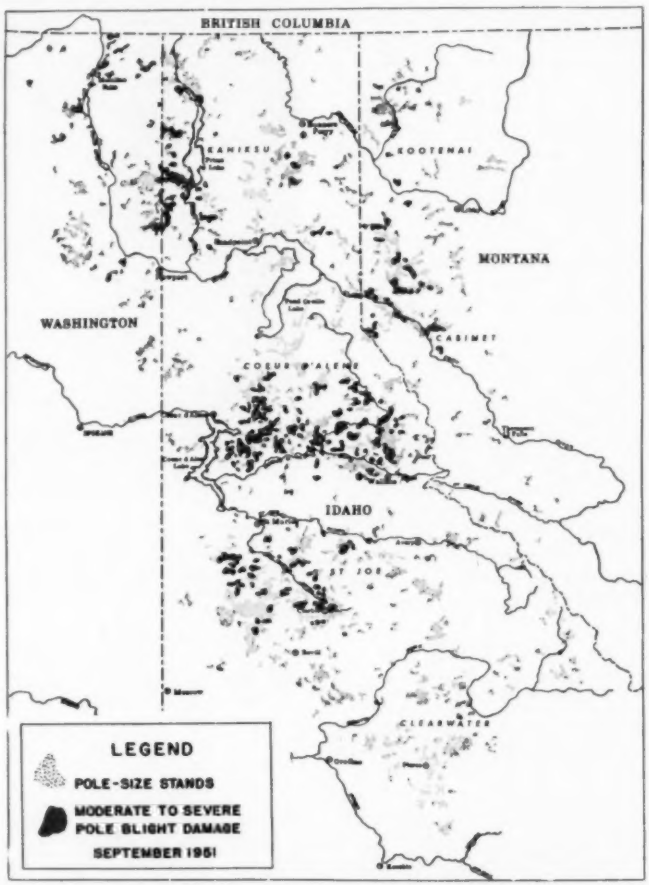

FIG. 1.—Distribution of western white pine pole blight.

Survey Results

In presenting a tabulation of the results of the pole blight surveys, the area data were computed from national forest sectionalized maps and from records made by field crews. They include all blight areas both within the forest boundaries and in the surrounding forested areas. The national forest names hereafter referred to represent the entire locality and cover a more extensive acreage than that only within the forest boundaries. Approximately 25,000 miles were flown, and some 50,000 miles were traveled in motor vehicles in conducting these surveys from 1949 to 1951.

Table 1 shows a total of 270 areas of various sizes affected by pole blight. Ground crews examined and verified 83 of these areas prior to 1950, 101 in 1950, and 86 in the 1951 field season. A few of the locations were previously reported as suspected areas by forestry workers and others, but confirmation was lacking. Approximately 75 percent of the new areas found were originally located through aerial surveys.

An estimate was made of the total acreage of pole blight by locality (Table 2). The distribution of pole blight in the United States is shown in Figure 1. The survey for the Kootenai-Cabinet areas was not completed until 1951. Approximately 10 percent of the acreage of all pole-size white pine stands is now affected by pole blight.

In general, the 60,000 acres of pole blight include only that acreage showing moderate to severe damage. In addition, there is, throughout the region, an undetermined acreage of pole-size stands with a scattering of pole-blighted trees where damage may later become appreciable. The Coeur d'Alene area contains a number of such stands. This area also has the largest proportion of pole-blighted stands.

Large aerial color photographs were taken in 1951 of a number of pole-blighted areas, to establish a visual record for a study of the intensification and spread of the disease.

An analysis of the data taken on aspect, site, slope, and stand composition showed no relationship between these factors and the incidence and severity of pole blight.

During these surveys, the youngest tree verified as having typical pole blight symptoms was 35 years of age, while several trees were older than 120 years. In most instances trees 40 to 60 years of age or younger were on excellent white pine sites whereas trees over 100 years were growing on fair to poor sites.

On the basis of these surveys it can be stated that pole blight appears to be intensifying and spreading, especially in the southern part of its range.

TABLE 1.—SUMMARY OF POLE-BLIGHTED AREAS

Year of survey	Areas[1] confirmed						
	Cabinet	Clear-water	Coeur d'Alene	Kaniksu	Kootenai	St. Joe	Total areas
Prior to 1950	11	0	46	12	3	11	83
1950	7	0	42	25	5	22	101
1951	10	0	28	17	12	19	86
Total	28	0	116	54	20	52	270

[1]Includes areas within the forest boundaries and in the surrounding forested areas, whether found by airplane or ground crews.

TABLE 2.—SUMMARY OF POLE-SIZE WESTERN WHITE PINE STAND ACREAGE AND THE ACREAGE AFFECTED BY POLE BLIGHT

Areas[1]	Pole-size white pine	1950		1951	
		Affected by pole blight[1]	Affected white pine pole acreage	Affected by pole blight	Affected white pine pole acreage
	Acres	*Acres*	*Percent*	*Acres*	*Percent*
Cabinet	60,000	4,700[2]	7.8	6,589[2]	11.0[3]
Clearwater	71,000	0	0	0	0
Coeur d'Alene	152,000	21,800	14.3	22,644	14.9
Kaniksu	243,000	15,300	6.3	15,618	6.4
Kootenai	42,000	1,600	3.8	1,641	3.9
St. Joe	172,000	12,600	7.3	12,815	7.5
Total	740,000	56,000	7.6	59,317	8.0

[1]Includes areas within the forest boundaries and in the surrounding forested areas.
[2]Moderate to severe damage.
[3]This increase is due largely to the incompleted air survey in 1950.

Discussion

In locating pole blight from the air it was found advantageous to fly west slopes in the morning and east slopes in the afternoon to make the most effective use of light.

Some blighted stands located from the air were never found by ground crews even after repeated attempts. In two such instances the areas were re-flown and, while circling and rocking the planes over them, ground crews took compass bearings on the position of the plane. The crews, following the compass readings, arrived at the locations without further delay. This procedure should prove of considerable value for use in future surveys. Because of inclement weather and at-the-time inaccessibility of some stands, few of the pole-blighted areas mapped could be inspected on the ground.

The 1950 survey revealed that pole blight was present some 5 miles farther south on the St. Joe National Forest than had been previously observed. This southernmost area of pole blight is located on Disalto Creek, south of the Palouse River in T 42 N., R 2 W., section 34, which is about 3 miles east of Laird Park, Idaho. So far no pole blight has been found in the Clearwater forests, although surveys have been made in the white pine stands under 100 years of age. The blight was not found any farther south in 1951 than in 1950 but a number of new areas near the southern extremity were discovered.

The survey for pole blight in the Coeur d'Alene basin was the

most difficult to conduct. There is so much blight present and it is so widely scattered that considerably more time is needed for examinations there than in other areas. In addition, the occurrence of large numbers of dead trees in parts of the forest makes accurate mapping from the air very difficult.

The observation and mapping of pole blight areas from the air, followed by inspection by ground crews, is the most satisfactory way of covering the region quickly, economically, and completely, including even the most remote parts. For best results aerial survey requires a slow, powerful three to four place plane and a pilot skilled in mountain flying. It is the most effective and cheapest form of survey possible, provided adequate equipment is used, with the exercise of good judgment as to safe flying conditions. Since pole blight appears to be intensifying and spreading, additional aerial surveys will be essential to determine the yearly progress of the disease.

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A Forester is First a Man

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For a half-century the forestry schools of America have been turning out foresters well trained technically within the patterns of the schools' respective curricula. But is it enough that a forester be a competent technician? Numerous leaders in the profession, especially in education, hold that he must be a well-adjusted man and a citizen before he can be anything else. Hence competence as a member of society and as a citizen is required if his professional career is to be successful.

FOR A DECADE the School of Forestry at Oregon State College has been examining the worth of its program by checking the performance of graduates and undergraduates on the job. One or more staff members spend a part of each summer in making this annual survey. The findings show that Oregon State foresters are acceptable as technicians; there have been no dismissals for technical incompetence. Citizenship is more difficult to measure. No examples of conspicuously bad citizenship have been discovered and the finding that a large number of the men are unselfishly active in civic affairs indicates at least a passable level of citizenship.

Personal competence is something else again. In general, the reasons for unsatisfactory progress, dismissal, or discontent seem to arise out of personal inadequacy. On this evidence the School of Forestry has re-stated its aims and revised its program. Its purpose now is to assist the self-development of its men as individuals, citizens and technicians, *in that order*. There is no virtue in graduating a straight A scholar so maladjusted socially that he cannot hold a job.

In an attempt to achieve its purpose, the school complements the curricular program with a vigorous personnel program. The curriculum is also examined continuously and changed when adequate evidence shows a need. The purpose of the personnel program is to enable every student to make of himself the best possible man within the limits of his abilities.

There is no one best way to aid the self-development of men. Some of the methods used by Oregon State College follow.

Staff

1. An educational program will succeed only if the men behind it intend to make it succeed. For this reason every staff member is expected to be sympathetic with the program, and to participate in it. Willingness and ability to contribute to student development are made conditions of staff employment. It is understood that the interest of the student is the first responsibility of the faculty.

2. If an instructor is sincerely concerned in students as individuals, if he is honest in his relationships with them, if he is competent in his own field, then he need not be a counseling expert in order to contribute effectively to a forestry personnel program. There are psychological and clinical experts on almost every campus who are equipped to deal with subtle deficiencies beyond the province of the layman. The forestry instructor needs to recognize only his own inability to deal with psychological difficulties, and where to refer the student for help.

3. A basic requirement of the staff member is that he be respected professionally. Respect is essential if he is to provide leadership for his students. The school is active in forestry on a state-wide basis, which gives staff members opportunities to work on advisory boards, technical committees, and other professional groups. Parallel to this, the instructors are urged to seek outside employment in forestry during the summers to enable them to keep their course work up-to-date and to bring fresh viewpoints back to the campus. Such staff contacts help to maintain good relations with prospective employers of foresters.

4. By their conduct, staff members exert great influence on students, especially in exemplifying good citizenship. At Oregon State, forestry instructors make an honest effort to be democratic, to share advantage and adversity equally with the student, to give each student a square deal. Because it is natural for young men to pattern their behavior after that of older men with whom they are closely associated, the instructors try to live in accord with high ideals of personal and civic behavior.

5. A final consideration of the staff man's place in the personnel program concerns his method of teaching. It is not necessary that a technical subject be narrow; it can be as liberal in outlook as a liberal arts subject. The important thing is that a course be not an end in itself, but a means of developing a man. Thus, courses become personnel processes as well as information dispensers, and help integrate the curricula and personnel program of the school.

Knowledge of the Men

1. It is not reasonable to expect a young man to behave like a mature man if he is addressed as a boy and treated as one. The school puts emphasis on a *man's* conduct, a *man's* professional responsibilities, and a *man's* place in the world.

2. The personnel program begins the first day a student enters the school. In addition to the usual routine of New Student Week, he is taken on a tour of the forest properties so that he can begin to feel like a forester. The tour winds up at the forestry club cabin on the school forest. Cooperating with the staff, student leaders conduct a program of introduction and information for new students.

3. Early in his first term each new student is given a friendly personal interview and welcome. He is informed of the school's traditions, standards, and requirements. His background is explored as well as his reasons for attending. He is encouraged to reveal his hopes and ambitions, and when he leaves the interview he knows that the school will do all it can to help him attain his goals.

4. To enable the faculty to become acquainted with the new students they are given an orientation course. At one general meeting a week outside speakers are brought in to explain career opportunities in forestry. The purpose is to help the men to make reasoned decisions on suitable careers. At a second weekly session, staff members meet for informal round-table discussions with small groups of freshmen. In these groups career opportunities are developed, and the men are encouraged to ask for information, personal as well as professional. As part of the orientation they are required to write out (1) their career objectives and reasons for them; and (2) a self-analysis, stating their personal assets and liabilities. From these statements, from the personnel records which students provide at registration, from the interview, and from the orientation discussion groups, it is possible to know the men fairly well.

5. All these data plus the college aptitude and interest scores help staff advisors to become acquainted with their men. In conference with the individual student at least once a term, efforts are made to detect and to help overcome personal deficiencies. Similarly the student's strengths are evaluated and he is aided in making the most of them.

6. Obviously, it is easier to obtain the confidence of friends than of strangers. For this reason a first name relationship prevails between students and staff in the school, as it so often does, in forestry, on the job. The effect sought is that of a group of men working in friendly association toward a common objective, the development of competent foresters. There is no deification of staff, no subservience of student, but an atmosphere of mutual respect.

7. During an annual rating conference the entire staff carefully appraises every student in the school. Inevitably, instructors will know some students better than others. The joint rating session helps to make all students better known to the staff as a whole. Families of the top students are sent letters explaining that they are outstanding students. The student who apparently is not fitted for a successful career in forestry receives a letter telling him so; and the resources of the school are offered to help him transfer to a more suitable field, or to work out a terminal, nondegree program.

Standards

1. No man develops the ability to overcome adversity if he never encounters rigorous working conditions. Consequently, course work and field trips are made reasonably, or even at times unreasonably, demanding.

2. Instructors keep alert to new developments in the field and to the requirements of employers. Thus they are better able to demand student work which will meet these requirements. Since employers expect men to maintain high standards on the job, it is reasonable to expect students to maintain high standards while in school. There would be less complaint about the low quality work of college graduates if they had been compelled to produce high quality work in college.

3. The school intends to be realistic in its approach to professional employment. On reviewing some of its personnel work recently, the manager of a large industrial organization said he thought perhaps some elements of the program were a little tough. Staff members were glad to have this assurance that the school is not too "soft."

4. As one means of making the program realistic, students must satisfy both employer and school with at least six months of forestry experience prior to graduation. A request for a work report is sent to every seasonal employer, and the contents of the report are used to develop the man. Where he shows special aptitude he is encouraged and assisted to develop that talent, and where he shows deficiencies he is helped to overcome them before the next season. If a report is very

bad it is investigated. Where injustice has been done, the student gets the full backing of the school in correcting the record. If a report is right, if the student is intolerably wrong, and if his prior actions question whether he should remain in forestry, two alternatives are open: (1) he can be placed on professional probation for a year, with the understanding that if his conduct falls below the standards expected of foresters, the school will recommend to the college that he be dismissed; or (2) if the facts warrant immediate action, a recommendation can be made that he be dismissed at once.

5. Because foresters need to be familiar with good English usage, specific attention is given to this subject. The forestry staff tries to uphold the standards of the English staff. All students, transfers as well as freshmen, are required to take a comprehensive examination in English. To the extent that any do not make a satisfactory showing, further work is required. By arrangement with the English department special remedial courses are provided for foresters. This increases the work load for students, but also increases their knowledge and proficiency in the written and spoken word.

Morale

1. The school takes the position that beginning with his first day, the student has committed himself to a professional career. He is not merely attending class, or reading texts, he is preparing to become a professional man with all the obligations which that condition entails. He is made to recognize that the school regards professional attitude very highly, and is proud of the performance of its graduates. Working under this principle, a casual high school youngster is early transformed into an earnest professional forester. By upholding the professional accomplishments of graduates and staff, the students develop a sense of pride in belonging to such company.

The intent of the school is to have every man so well prepared that he can meet normal competition, up to the limits of his own abilities. He is made aware that high standards of performance are expected because he is a graduate of the school. This attitude can't be beat as a morale builder.

2. One of the best ways to build morale and to develop men is in encouraging students to participate to a reasonable degree in the conduct of the organization. The more mature men in the school have good ideas about its effectiveness. In senior seminars, students are asked to cooperate in an annual appraisal of the school program. Their criticisms of curriculum and instruction are often helpful. They also collaborate on staff projects (this paper for example).

To give the seniors a feeling that they are colleagues in the educational process, and to heighten their awareness of the importance of personal relationships, they are requested to act as freshman advisers.

3. Another joint project with the upperclassmen is attendance at regional and local meetings of the Forest Products Research Society, The Society of American Foresters, and the logging congresses. Class schedules are adjusted, and in some cases staff or school transportation is provided in order to facilitate attendance of the men—as participating members, not just as student visitors. (This effort eventually stimulates membership in professional societies.)

4. The men know that they always have the backing of the school. Action on seasonal work reports has been mentioned. The same attention is given to graduate work reports. These are sent out to employers one, three, and five years after graduation. At the end of the first year following graduation the man himself gets a letter from the school inquiring as to his progress, his plans for self-development, his satisfaction with his work, and his needs, if any. This close attention to the graduate is not locking the barn door after the horse is stolen. Far from it. This school makes no claim to educate a complete forester in four years. Its greatest responsibilities commence *after* commencement day, when its product, the graduate, is put into use. That's when he may need guidance and friendly counsel as he never did before; and that's when a sound personnel program will provide means to help him.

5. For the benefit of prospective employers and employees, the school keeps informed on the current employment opportunities. When employer needs are carefully analyzed and competently filled, favorable employment contacts are built up. Graduates know that they are welcome to ask the school for information, and have confidence that it will be correct. This relationship maintains morale and develops the kind of support which will bring in more jobs in the future.

To summarize: The School of Forestry at Oregon State College makes its personnel program an integral part of the academic process. The aim is to graduate men who will be personally as well as professionally competent, to ensure that regardless of grades every man who leaves is a better man than when he entered.

Comments on "A Forester Is First a Man"

We, the senior class at the Oregon State College School of Forestry, believe that Dr. McCulloch's article requires a follow-up that will express our points of view on the school's personnel program. Since we are the products of this program and have seen it in progress for the past four years, we believe that we are qualified to give a first-hand account of its results. This paper is the consensus of the entire senior class.

The two things about our school that have impressed us the most are the first name relationship that we have with our instructors and their attitude towards us as foresters and men. We have the privilege of conferring with them at any time, on any problem, be it personal or technical, and know that the answer will come from a friend and not just a college professor. We knock on their doors and the invitation to enter is always, "What can I do

for you?" and not "What do you want?"

We are made to feel that our career begins the day we first step through the front door. We are welcomed as brothers and equals in one of the finest of professions. We are expected to conduct ourselves as men, to do a man's job, and to learn the feeling of a man's reward, the satisfaction of a job well done.

In classes the staff makes the work parallel an actual job which requires high standards. We know that if we can handle these assignments we will be better prepared to meet squarely the obligations we owe to the profession. Mac's article mentions that there are people who think the school is too tough on us and that the work standards are too high. None of us believe this for a moment. Those of us who perhaps did believe it have either fallen by the wayside or have been helped into fields to which they are better suited. There is no room in this school for men who cannot meet professional forestry standards.

We are made to feel that we are a part of this program at all times. Through participation in the forestry club we are encouraged to help make and enforce the policies of the school. Problems that arise are laid squarely before us to work out. If any student has a constructive criticism of the curriculum, he may feel free to recommend any changes. This applies not only to forestry courses but to cross-campus subjects as well. A number of changes have been made, proving that this privilege is not taken lightly.

This participation follows throughout our professional life. Since we are always in contact with the school and are in a position to know, we are asked to follow through and help to continue this program of keeping the curriculum and policies up to date. There is no place in the school for a technical course that doesn't parallel professional work in the field.

Perhaps the greatest single thing that has resulted from this personnel program is the morale it has built up in the students and graduates. (Mac's belief that you can put attitude into a man is exemplified by this paper.) It doesn't stand to reason that a man just entering the school can possess the thoughts and feelings that we do. It is only through a program as intense as this that in the short span of four years boys can be changed into men and foresters. There has been built up within us a feeling of confidence in and responsibility to our profession, to our school, and to ourselves. We know that the school is behind us in all that we do and is more than willing to help us with the problems that will confront us in the field.

The idea that once we've graduated and received our diploma and then are on our own, does not apply here. We don't want to sever the school ties because they mean much to us personally as well as professionally. For under this program the school is to the profession as the foundation is to the tower. The higher you reach the better the base must be.

This feeling of closeness is exemplified by the attendance at our annual Fernhopper's Banquet. Graduates from all parts of the Northwest attend and consistently make it one of the largest gatherings of foresters on the West Coast. Through this meeting friendships are renewed, students become acquainted with the alumni, and the current needs of the profession are brought into focus. No better reason could be given for holding this affair than to give the students an opportunity to see at first hand the results of this program. This function of the school is hard to beat as a morale builder.

In addition, a custom has been built up that is very nearly as old as the school itself. It is the wearing of a mark of identification that makes us stand out from the rest of the college students. Every Wednesday we don red neckties that, when seen in the classes, leave no doubt in the minds of our cross-campus colleagues that we are foresters and proud of it. This is but another bit of evidence to prove how much the personnel program has done toward increasing morale.

The program has been planned to give every possible aid and assistance to the profession as a whole. It isn't limited to us alone, but is extended to other foresters. Hardly a week goes by that a fellow forester, who has received his training from some other school, doesn't stop by with a problem that confronts him and asks for help. Everything possible is done to aid him, thereby furthering the standards of the profession.

While we are very earnest in our backing of the theories and ideals set forth by the program, we must point out that there are weaknesses, as there are in any new precedent that is established. The school is trying to eliminate these through knowledge and experience gained as the program develops. Where this is not too well understood, as by some freshmen and transfer students, a certain amount of resentment is felt. But as they come to a realization and an appreciation of the goals of the program, resentment fades. We believe that by the time today's freshmen become seniors, this program will be as equitable as its originators intend it to be.

To summarize our feelings towards this is rather difficult. We have touched on only a few of the many aspects that can be covered. On every side we see how it can apply to us in future years and how much influence it will have on our professional conduct. Through it we have been made aware of our shortcomings and an earnest attempt has been made to help us to overcome them and guide us toward becoming better men. We know that we have been given a challenge to meet and a goal to reach and it is up to each one of us how high we set our sights. We have been given a feeling of confidence in ourselves, a knowledge of the obligation we have to the profession, and a sincere hope that through our conduct in the future we can bring credit to our school. We give a heartfelt thanks to our instructors for a job well done.

A Needle Blight of Loblolly Pine Caused by the Brown-Spot Fungus

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THE BROWN-SPOT NEEDLE BLIGHT of pines, caused by the fungus *Scirrhia acicola* (Dearn.) Siggers, has been studied in detail (*2, 5, 6, 7, 8, 9, 10*). Major attention has been given to the disease on longleaf pine (*Pinus palustris* Mill.). Although Hedgcock (*2*) early noted that pines other than longleaf may be diseased, the fungus has not been reported as prevalent or severe on other pines, with the exception that Luttrell (*3*) attributed the decline of a planted stand of ponderosa pine (*P. ponderosa* Laws.) in Missouri, outside its natural range, to *S. acicola*. The following observations in the Southeast indicate that a prevalent needle dieback of loblolly pines (*P. taeda* L.) of different sizes was caused by the brown-spot fungus.

Occurrence and Damage

Loblolly pine needle browning was studied in the fall of 1949 and 1950. As early as September in the Carolinas for example, partly dead needles of the current year were seen on many trees. Seedlings, saplings and pole-sized and mature trees were affected. The foliage of some diseased trees was so brown that at a distance it appeared to have been scorched by fire. This appearance lasted through the winter until new needle growth in the spring obscured the brown needles. In the fall of 1951, the disease was less noticeable, possibly because the unseasonably dry summer did not favor infection.

Numerous collections of diseased needles indicated that the brown-spot fungus was consistently associated with this needle dieback. Its conidial fructifications were frequently found on the dead needle tips. Incipient brown-spot lesions were noted on the green basal portions of diseased needles and the fungus was cultured from some of these discolored spots. Fruiting bodies of *Lophodermium pinastri* (Schrad.) Chev. also occurred on some needles. They were present only on dead needle tissue and the writer believes that this fungus did not cause the dieback (*1*).

The effect of the brown-spot disease on loblolly pine growth was not evaluated. It is probable that it markedly retarded seedling growth; in reproduction seen within forest stands along the South Carolina coast, diseased seedlings were only about one-fourth as tall as adjacent healthy seedlings of the same ages. In spite of the unhealthy appearance of larger diseased trees, no mortality among them was directly traceable to *Scirrhia acicola* infection; however, the lessened functional needle surfaces probably resulted in slower growth.

A somewhat similar needle dieback may also be caused by another fungus, *Hypoderma lethale* Dearn. In contrast to the brown-spot disease of loblolly pine, which becomes noticeable in the fall, needle blight induced by *H. lethale* first appears in late winter or early spring. Slash and pond pines (*Pinus rigida serotina* (Michx.) Loud) as well as loblolly pine, were commonly infected, in the spring of 1949, 1950, and 1951. The brown-spot fungus was only occasionally found on pine needles that first showed dieback at these times.

Pathogenicity Tests

Since *Scirrhia acicola* fruits on dead pine needle tissue as well as on artificial culture media, it was necessary to demonstrate its ability to infect loblolly pine needles. Hedgcock (*2*) reported an unsuccessful attempt to inoculate two loblolly pine seedlings. However, the infection of longleaf and slash pine needles by means of conidia has been accomplished (*2, 7*). Recent trials to cross-infect seedlings of several southern pines with conidia did not succeed (*4*).

The pathogenicity of *Scirrhia acicola* to loblolly pine needles was determined by spraying seedlings with sterile water suspensions of conidia from cultures about 2 weeks old. The fungus was originally cultured from a diseased loblolly pine needle collected near Charleston, S. C., November 14, 1950. All spores used as inoculum were derived from a single spore taken from this isolate.

One-year-old loblolly, slash, and pond pine seedlings that had been potted in the fall of 1950 were inoculated in a greenhouse at intervals, beginning in February 1951, before new needle growth started. Nine separate inoculation tests were made (Table 1). Glass slides placed next to the seedlings were also sprayed at the time of inoculation. One control plant of each species was sprayed with sterile water only in each test. The pines were then placed within individual moist chambers. Celluloid cones wrapped outside with wet cotton were used to cover seedlings in Tests 1 through 6. Seedlings in Tests 7 and 9 were placed under wire cylinders covered with wet muslin. The effect of both treatments was to maintain the pines in humid air at temperatures lower than those of the outside air. When an exposure period ended, the slides were examined and the presence of germinated spores was verified in nearly every instance.

Scirrhia acicola has never been observed naturally in the vicinity of Asheville, N. C., where the tests were made. This fact, coupled with the removal of all discolored 1950 needles from the seedlings before the 1951 needles emerged, makes it reasonably certain that the infections resulted only from the de-

TABLE 1.—*Scirrhia acicola* INOCULATIONS OF LOBLOLLY PINE SEEDLINGS, 1951

Test number	Needle length	Air temperature during inoculation period	Period in moist chambers	Inoculation date	Date dieback first observed	Trees inoculated	Trees diseased[1]		Diseased needles per seedling
	Percent of final	*Degrees F.*	*Hours*			*Number*		*Number*	*Number*
1	0	55 to 80	72	Feb. 19	—	2	Loblolly	0	—
						1	Slash	0	—
2	10	55 to 91	76	Mar. 7	—	5	Loblolly	0	—
						5	Slash	0	—
3	20	54 to 84	72	Mar. 27	—	4	Loblolly	0	—
						4	Slash	0	—
4	30	52 to 87	73	Apr. 4	—	2	Loblolly	1[2]	3
						2	Slash	0	—
						2	Pond	0	—
5	40	45 to 95	74	Apr. 17	Sept. 17	2	Loblolly	2	1, 50+
						2	Slash	0	—
						2	Pond	0	—
6	60	56 to 77	144	May 17	Sept. 26	5	Loblolly	3	1, 5, 10
						5	Slash	4	2, 3, 10, 17
7	100	53 to 95	168	June 12	Sept. 26	3	Loblolly	3	50+, 50+, 50+
						1	Slash	1	14
8[3]	100	—	—	July 2	Sept. 26	5	Loblolly	4	11, 11, 25, 50+
						3	Slash	3	5, 26, 50+
9	100	65 to 99	48	Aug. 6	Oct. 19	2	Loblolly	1	2
						2	Slash	0	—
						2	Pond	0	—

[1]None of the control seedlings were diseased.
[2]*Scirrhia acicola* reisolated from lesions on needles.
[3]Seedlings exposed to light rains and high relative humidities for 48 hours after inoculation.

scribed inoculations. Only infections that developed on the 1951 foliage were counted. Needles were regarded as diseased, if they had partly or wholly died back and bore fructifications of the fungus, or, less commonly, if multiple lesions characteristic of *S. acicola* infection were present. All seedlings were examined at bi-weekly intervals after inoculation. A total of 14 loblolly seedlings and 8 slash seedlings developed needle blight. None of the pond pines showed symptoms of infection. The control seedlings remained disease-free also.

In these tests young needles were less susceptible to infection by *Scirrhia acicola* than older needles of the same season, since needles shorter than about one-third of their final lengths when inoculated did not become diseased. Two to five months elapsed before the appearance of needle dieback. Needles inoculated in April and May did not die back sooner than older needles exposed to conidia in the summer. This observation suggests that the brown-spot fungus may be better able to infect older needle tissue.

Typical needle dieback similar to that observed on forest trees was induced on both loblolly and slash pine seedlings. Since the inoculum was derived from a naturally infected loblolly pine needle, the ability of the fungus to cross-infect slash pine was demonstrated.

Summary

A prevalent needle dieback of loblolly pines of different sizes was observed in the Southeast in 1949 and 1950. The brown-spot fungus, *Scirrhia acicola*, was regularly associated with this disease, which became evident in the fall of both years. Inoculations of loblolly and slash pine seedlings with *S. acicola* conidia resulted in the development of similar needle dieback. The brown-spot fungus should now be recognized not only as a cause of a needle blight of longleaf pine seedlings but also as a cause of considerable needle browning on large as well as small loblolly pines.

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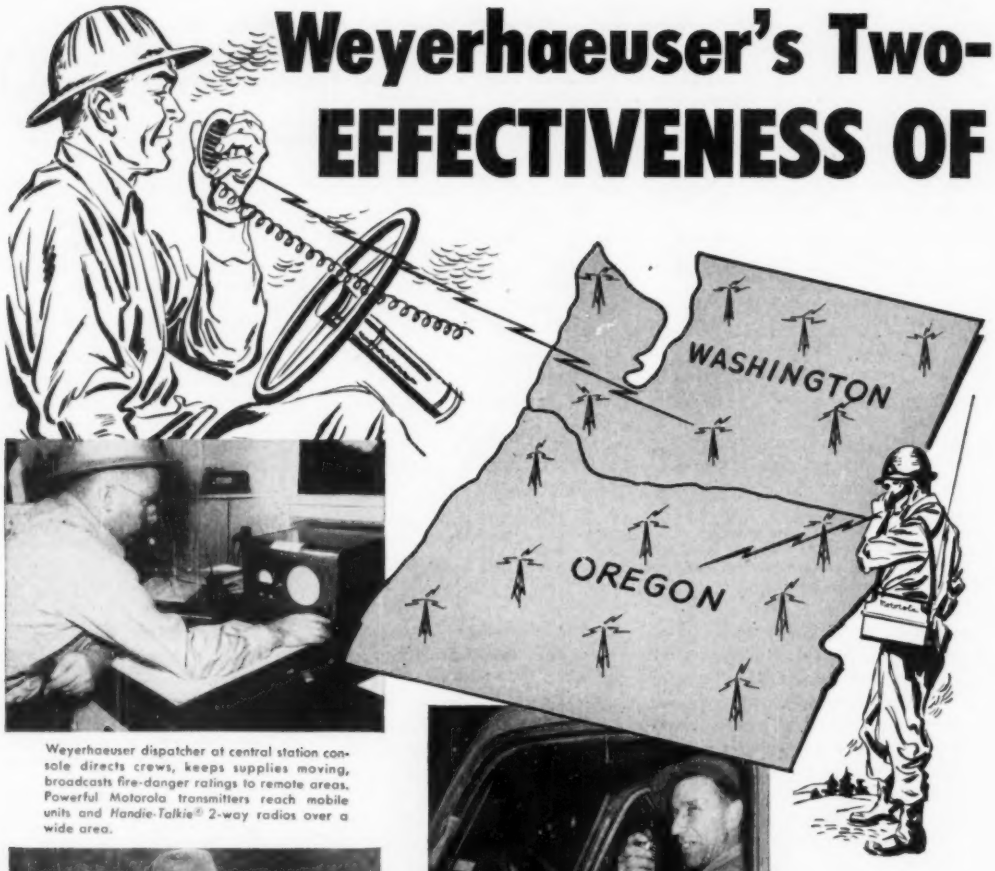

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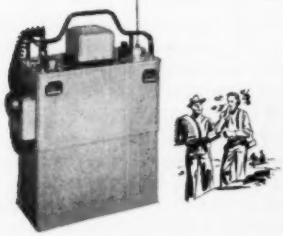

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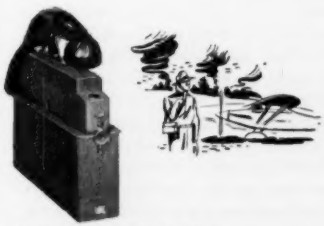

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Notes

Basal Spray or Stump Spray?

Two recent theses[1] submitted at North Carolina State College provide an interesting comparison of two methods of hardwood control with 2,4-D[2] and 2,4,5-T,[3] basal spray technique and stump treatment. This study was a joint project to test the effects of these chemicals on small stems of some of the hardwood species which present a serious problem in regeneration of pine stands in the upper Piedmont of North Carolina. The project was established on the Hill Forest of North Carolina State College in Durham County.

Areas were selected from which pine stands had been harvested 15 to 20 years previously. Hardwood ranging up to about 5 inches d.b.h. had completely dominated the areas after cutting, with a few scattered overstory trees which had been left. All stems from 2 feet in height to 4.5 inches d.b.h. were included in the treatments. Larger stems were poisoned with Ammate.

The 12 treatments and 3 checks used were randomly assigned to each of four blocks on two areas, giving 8 replications in the random block design. Phase I (Barber 1951) compared three levels of concentration (1, 2, and 4 percent acid equivalent solution by weight) of two preparations, 2,4,5-T and a mixture of ⅓ 2,4,5-T and ⅔ 2,4-D applied as sprays to freshly cut stumps during the dormant season. Phase II (Dellinger 1951) compared these same solutions applied as basal sprays to the lower one-foot of intact stems. Kerosene was used as the carrier for the solution in both phases, and checks were installed to record any possible effect due to kerosene.

The criteria for determining kill were: (1) absence of sprouting from the stumps, and (2) the death of the crowns and absence of sprouting from stems treated with the basal spray. Observations were recorded at the end of the first growing season, October 1950, about 8 months after treatment.

In an effort to throw some light on the question of how much hardwood control is necessary for the establishment of loblolly pine, one test area was planted with 1-0 stock immediately after treatment. A survival of 88 percent was observed at the end of the first growing season. Future observations will be made on the area, and the ability of the pines to tolerate a scattered overstory or compete with sprouts should provide some clues to the solution of the complex problem of regeneration of pine in the Piedmont.

The over-all percentages of kill were very similar for both methods of treatment. The basal spray may prove more effective in the long run because many stems which were not killed were definitely weakened and are thus more susceptible to disease and to damage from adverse growing conditions. Table 1 shows the comparative rates of kill for each treatment.

Table 1 is based on observations of approximately 7,000 stems. Sprouting of stems treated with the basal spray ranged from 2.1 to 3.6 percent for any treatment. It was observed that there was little correlation between sprout vigor and chemical concentration applied, although there was a definite decrease in sprout vigor from treated stumps as compared with those on check plots. Incidential observations also showed that the average stump height of sprouted stumps was approximately the same for all treatments, demonstrating that stump height had little effect on sprouting, with the possible exception of the extremes. The average stump height was 6 to 7 inches.

Inspection of the table will show the similarity of the percentages of kill for 2 and 4 percent 2,4,5-T, and 4 percent 2,4,5-T + 2,4,-D. For 2,4,5-T, the critical concentration point lies between 1 and 2 percent, while for the mixture it is between 2 and 4 percent. These critical concentration points assume considerable importance because a difference of 1 percent in solution concentration can affect cost by several dollars an acre. These figures also imply that in the mixture, the amount of 2,4,5-T may be the critical factor rather than the total concentration.

Basal spraying appears to be superior for dogwood and the miscellaneous species encountered, while the stump treatment seems better for hickories and oaks. The size of this experiment did not permit the determination of accurate cost figures, but indications were that the basal spray technique is cheaper, the difference approximating the amount of labor required for the cutting. Thus, unless there is some particular reason for cutting the stems, the results indicate that the basal spray is more economical for small stems.

These chemicals are capable of producing any desired amount of control, the question being how much does the timber owner want, or can he afford. Any method of controlling hardwoods is necessarily expensive, therefore the difference in cost between methods or the efficiency of application may easily

TABLE 1.—PERCENT OF STEMS KILLED BY TREATMENT

Concentration	2,4,5-T			Kerosene	2,4,5-T + 2,4-D		
percent	1	2	4	check	1	2	4
Stump spray	69.4	81.0	82.8	24.8	67.6	69.9	81.1
Basal spray	66.3	81.7	82.1	4.7	64.0	71.7	80.2

[1]Barber, John Clark. The control of various species of hardwood brush with 2,4-D and 2,4,5-T applied to freshly cut stumps during the dormant season. Thesis, North Carolina State College. 1951. Dellinger, Henry Clinton. Bark application of silvicides in hardwood control. Thesis, North Carolina State College. 1951.

[2]2,4-dichlorophenoxyacetic acid, butoxy ethanol ester.

[3]2,4,5,-trichlorophenoxyacetic acid, butoxy ethanol ester.

justify or prohibit any particular method in a given situation. These tests demonstrate the effectiveness of the chemicals used. The next step is to reduce the cost sufficiently to promote widespread application.

Future observations will be made to study secondary and indirect effects caused by these chemicals upon the treated stumps and stems.

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Cost Minimization in the Primary Transport of Forest Products[1]

Some costs incurred in the process of logging are influenced by layout of the various facilities employed. Certain layout types allow mathematical formulation of the costs involved which leads, in turn, to the possibility that mathematical treatment can be carried further in order to find the optimum spacing that should be used if cost sums are to be minimized. The complex nature of logging costs prohibits simple simultaneous treatment of all spacing by a single, complete method. Often the reduction of the scope of interest to include only a subset of costs fails to simplify the problem. This behaviour can be expected particularly when more than one influencing variable must be considered in a simultaneous system. The problem of minimization of the sum of landing, spur, and skidding costs which belongs in the latter category, had been inadequately developed[2] prior to the initiation of this research. This portion of the overall field of logging cost control was chosen for further investigation. Mathematical development of a methodology whereby optimum landing and spur spacings could be easily found was the main objective. The prevailing practice of assuming reasonable uniformity of the logging area and availability of accurate estimates of necessary parameters was continued in this work.

The development progressed through two distinct phases, formulation and minimization. The formulation phase was devoted to the correct mathematical description of average skidding distance, a procedure that yielded results beyond the needs of the chosen problem. These surplus findings are presented in appendix form for use in other situations requiring estimates of average skidding distance. All other necessary formulation had been properly treated in the cited previous work and, therefore, required no further effort.

The minimization phase consisted of a series of searches for a simple method for finding optimum spur and landing spacing. A system was devised that allowed the construction of two alinement charts that indicate these optimum spacings once cost of landings, cost per mile of spurs, unit operating cost for the skidding device, and proposed volume cut per acre are known. These charts make it possible to find the desired values without mastering the supporting technique.

One of the main advantages of the derived methodology lies in the fact that a uniform approach is made to each field problem. The theoretical values obtained resemble a datum plane from which planning can be started. Experience under various field conditions will likely indicate that theoretical values should be altered to some extent for practical use. However, the alteration in each case can be made with respect to a uniformly obtained frame of reference.

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[1]Abstract of a thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Forestry and Agricultural Economics, May 1952, Purdue University, West Lafayette, Indiana.

[2]Matthews, Donald Maxwell. Cost control in the logging industry. McGraw-Hill, New York. 1942.

Growing Stock Differences in Even-aged and All-aged Forests

In 1922, while lecturing at Oxford University School of Forestry, Ray Bourne[1] undertook to determine how the growing stocks of even-aged and all-aged forests differ. He studied the forests of Great Britain, Germany, and Switzerland. In 1924 he applied selection management to even-aged beech woods in England, and measured the effects through 1945. His findings, which are of interest and value to American foresters, were published in "A fallacy in the theory of growing stock" in *Forestry* (Vol. 24, pp. 7-18 and 159-161) in 1951.

When Bourne began his studies, all his experience had been with even-aged management; and he was convinced that there could be no difference between normal growing stock of even-canopied and uneven-canopied woods other than a redistribution of the age classes over small areas. As his observations widened, however, he decided that this was a fallacy and that methods of yield regulation for uniform forests could not be applied to selection or uneven-aged forests. He reports observing in all countries that man-made even-canopied forests rarely approach maturity without dislocation of management results by natural calamities or by the necessity of lengthening the regeneration period.

He also observed that advanced growth appeared wherever accidental opening of the canopy had taken place in even-aged woods, whether in the pine forests of Prussia, the beech and mixed woods of England, or the beech, silver fir, and spruce forests of Switzerland. Even in slight openings the new growth sometimes survived for considerable time. Improvement thinning in the overcrop assured the success of the advance growth and eventually established the whole series of age classes from seedlings

[1]Died November 30, 1948. He was awarded posthumously the medal of the Society of Foresters of Great Britain.

TABLE 1.—NORMAL GROWING STOCKS OF EVEN-CANOPIED AND UNEVEN-CANOPIED SPRUCE-FIR FORESTS

Age gradations	Even-canopied crops (80 acres) Acres	Trees Total	Trees Ratio to final stocking	Volume Average tree	Volume Total	Volume Distribution	Uneven-canopied crops (80 acres) Acres	Trees Total	Trees Ratio to crop trees	Volume Average tree	Volume Total	Volume Distribution
Years		*Number*		*Cu. ft.*	*Cu. ft.*	*Percent*		*Number*		*Cu. ft.*	*Cu. ft.*	*Percent*
1-20	20	30,000	6:1	⅔	20,000	10	—	30,000	4:1	⅓	10,000	4
21-40	20	15,000	3:1	2	30,000	15	—	15,000	2:1	1½	20,000	7
41-60	20	8,000	1.6:1	7½	60,000	30	—	8,000	1.1:1	7½	60,000	22
61-80	20	5,000	1	18	90,000	45	—	7,500	1	24	180,000	67
Total	80	58,000			200,000	100	80	60,500			270,000	100

FORESTS OF EVEN-CANOPIED CROPS

1. Production is limited by the number of trees of any age which can stand to the acre, and by the fact that they must stand in defined areas.
2. The need to preserve the canopy throughout the rotation prevents the removal of many poor trees.
3. A big sacrifice is involved in having to thin so many immature trees just prior to maturity.
4. With trees of the same age, the smallest trees in a crop are roughly half the size of the largest, so that many trees are cut on the small side.
5. With planting in wide espacement (4½ ft. +), it is impossible to produce clean timber without pruning.
6. Brashing [clubbing off dead limbs] is often a very expensive operation.

FORESTS OF UNEVEN-CANOPIED CROPS

1. Production is greatly influenced by the fact that trees of different sizes can share space in the canopy, and by the fact that trees of different ages are not bound to stand in defined areas.
2. The possibility of breaking the canopy permits the removal of all poor trees at an early age.
3. All good trees grown through to the large pole stage can be kept to mature.
4. Each tree can be grown to its most economic size.
5. With planting with wide espacement, in partial shade, trees can be drawn up and will prune themselves.
6. If the woodmen thoroughly understand the principle of cleaning, or early high thinning, they can make the forest, greatly simplifying the work of the forester in the later thinnings.

to mature timber on some acres. On these areas the spaces occupied by tree roots and crowns of various age classes were telescoped and shared, and the most efficient use was thus made of growing space.

The Swiss have long understood these phenomena and have modified forest practice to take advantage of them, Bourne states. By fostering advance growth and developing uneven-canopied forests they no longer need to maintain a series of areas of age gradations. Recruitment takes place all over the forest, and control is by volume instead of by age and area. More large trees are carried with ample regeneration and recruitment than in even-aged woods. Furthermore, selection of crop trees and concentration of increment on the finest individual stems makes the quality of the large timber better and the value per unit greater. Of great importance to the Swiss, all-aged forests are more resistant to wind damage and to other calamities than are even-aged forests.

To illustrate the difference in growing stock of all-aged and even-aged forests of spruce and silver fir in Switzerland, Bourne gives diagrams and notes based on Biolley's records of 50 years of all-aged management of the communal forest of Couvet, Canton Neuenburg, and on Flury's yield tables for even-aged forests. The diagrams are here condensed into Table 1, but the notes are quoted verbatim.

In connection with the data in Table 1, Bourne explains that in uneven-canopied forests the total number of stems in smaller classes is the same as in the even-canopied area. But since these small trees are sharing space with the larger classes, more large stems can be grown on the same area than in even-canopied forests. Furthermore in the uneven-canopied woods the stem volume of the two smaller size classes is less because of shading, and of the largest class is greater because of reduced competition, than for similar size classes in the even-canopied forest where each size class is confined to a definite area.

Table 2 summarizes Mr. Bourne's estimates of the annual yields for the two 80-acre areas.

The article explains the larger returns from the uneven-canopied forest as due to a larger volume of big timber and higher quality and greater unit value of crop trees than in even-canopied forests.

Finally, Bourne gives his own results from applying selection management to even-aged beech forests in the Chiltern Hills. As an example of these results, Table 3 shows the changes in growing stock for one 25-acre compartment. In 1924 the even-aged woods had a total volume per acre of 1,256 cubic feet in trees ranging from 6 to 20 inches in diameter and averaging 11 inches. Only 22 percent of the volume was in trees 15 inches and larger. By 1945 the volume per acre had increased to 2,062 cubic feet, of which 73 percent was in trees 15 inches and larger. The size of the average tree was about 15 inches.

Table 3 also gives the growing-stock distribution that Bourne pre-

TABLE 2.—ANNUAL YIELDS OF NORMAL EVEN-CANOPIED AND UNEVEN-CANOPIED SPRUCE-FIR FORESTS

Canopy	Intermediate		Final	
	Cu. ft.	*Shillings*	*Cu. ft.*	*Shillings*
Even (80 acres)	4,500	3,000	4,500	6,000
Uneven (80 acres)	4,500	3,000	9,000	15,000

TABLE 3.—DISTRIBUTION OF SIZE CLASS IN ALL-AGED AND EVEN-AGED BEECH FORESTS

Size classes	All-aged								Even-aged volume distribution
	Volume per acre				Volume distribution				
	1924	1931	1945	Ideal	1924	1931	1945	Ideal	
Inches	*Cubic feet*				*Percent*				*Percent*
6 to 10	257	91	99	300	20	5	5	14	50
11 to 14	727	646	466	475	58	36	22	23	42
15+	272	1,037	2,062	1,325	22	59	73	63	8
Total	1,256	1,774	2,062	2,100	100	100	100	100	100

sents as ideal for this compartment, and the distribution of a normal even-aged beech forest, calculated by him from Schwappach's yield table for beech, quality III, with 120-year rotation (which age corresponds to that of the mature all-aged dominants in the stand with which Bourne worked).

At the end of his article, Bourne lists the following conclusions:

1. It has been demonstrated abroad and in the Chiltern Hills of England that a selection-type growing stock in a given forest carries more large-size timber per acre than an even-aged growing stock. It is fallacious to apply to selection forests growing-stock figures calculated from yield tables computed from even-aged stands.

2. This more efficient selection type of stocking has developed from modified practice adopted owing to failures in the management of forests according to even-aged yield-table methods.

3. The selection-type forest is less vulnerable than even-aged stands to calamities such as storm.

4. To ensure maximum stocking, some degree of mixture of species is preferable, as better sharing of space, light, and soil results, and regeneration is helped.

5. The larger quantity of timber produced per acre in a selection forest is also of higher quality because regeneration crown thinnings remove the poorer stems. Thus, in addition to the mere superiority in quantity of large timber, the value of selection forests tends to outstrip the value of even-aged woods.

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Reproduction on Windfalls in A Northern Hardwood Stand

Obtaining reproduction of desirable species is one of the important phases in the management of forest stands. Even though hardwood stands can regenerate successfully through sprouting, trees of seedling origin are usually more desirable than those of sprout origin.

Differences in micro-site may often affect the relative abundance, distribution, and species composition of seedling reproduction. The importance of micro-site reaches its peak in certain blowdown areas. Because of the uprooting of trees, conditions are created that are entirely different from those in either the undisturbed stand or in similar areas that have been cut over. In addition to the removal of the crown canopy, a micro-aspect may be created that differs 180° from the macro-aspect, a very steep micro-slope may be created from a relatively level area, numerous depressions and mounds may be created from uniformly even areas, and important differences in seedbed conditions and moisture relationships may result.

While making a study of the reproduction of the 1938 hurricane-blowdown areas on the Bartlett Experimental Forest, Bartlett, N. H. in August 1951, the writer noticed that the species and the amount of reproduction varied greatly among different parts of the uprooted areas at the bases of the windfalls. Therefore the reproduction occurring on these uprooted areas was counted and tallied as to place of occurrence (Fig. 1):

1. On the top edge of the uprooted soil portion.
2. On the upper surface (humus layer exposed) of the mound.
3. On the lower surface (mineral soil exposed) of the mound.
4. In the depression created by the uprooting.

In this study, only those stems more than 4 feet high were considered as established reproduction. Practically all of these had originated the season following the hurricane. The established reproduction occurring on the 104 windfalls examined is summarized in Table 1.

Very little reproduction occurs in the depression caused by the uprooting of the tree. This is exactly opposite to what might be expected.

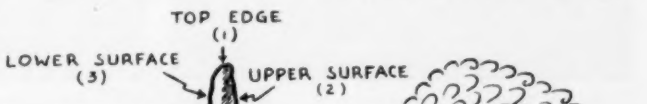

Fig. 1—Sketch of a typical uprooted tree, showing the four different micro-sites created.

TABLE 1.—DISTRIBUTION OF SEEDLING REPRODUCTION ON 104 WINDFALLS, BY SPECIES AND MICRO-SITE

Species	Top edge (1)		Upper surface (2)		Lower surface (3)		Depression (4)		Total	
	Number	Per-cent	Number	Per-cent	Number	Per-cent	Number	Per-cent	Number	Per-cent
Paper birch	23	54	7	16	13	30	—	—	43	100
Yellow birch	68	48	27	22	27	22	9	8	121	100
Pin cherry	24	41	24	41	6	11	4	7	58	100
Striped maple	12	37	13	41	5	16	2	6	32	100
Beech	—	—	5	36	3	21	6	43	14	100
Sugar maple	1	17	2	33	1	17	2	33	6	100
Red spruce	—	—	6	100	—	—	—	—	6	100
Red Spruce	—	—	1	100	—	—	—	—	1	100
Elderberry	—	—	4	100	—	—	—	—	4	100
Total	118	42	89	31	55	19	23	8	285	100

since the mineral soil is exposed, thus creating ideal seedbed conditions for most species; also, the depression covers a greater area than the other three sites, and it affords more moisture. However, the mineral soil in the depression does not remain exposed for any appreciable length of time. Soon after the tree is uprooted, leaves are blown into the depression and a thick mat of leaf litter is formed. As a result, very few seedlings are able to become established. Also, with the melting of the snow in the spring, these depressions may actually be transformed into small pools of water. This excessive moisture may prevent the germination and establishment of seedlings.

Much of the difference among species in the distribution of seedlings on the various micro-sites can be attributed to the size of the seeds and their palatibility of rodents and birds. Those species that have large, heavy seeds, such as beech and sugar maple, were relatively uncommon on the top edge and lower surface of the mound because, in comparison with the birches, their seeds were less likely to become lodged in the crevices and irregularities of these surfaces. Besides, in these exposed positions they were more easily found by rodents and birds. Only in the depressions where the seeds were concealed by the leaf litter was there a high representation of beech and sugar maple.

The large number of stems occurring on the upper surface of the mound can be explained by the fact that most of the seeds had already been disseminated before the hurricane and thus were already lodged on that surface when the blowdown occurred. Pin cherry was especially abundant because of the ability of its seeds to remain viable in the duff for many years.

The practical significance of this study is in the relatively greater proportion of birch (especially paper birch) on the top edge and lower surface—the sites of greatest exposure of the mineral soil—than on the other sites. In the same area, a survey of 43 milacre plots where the soil had not been disturbed failed to reveal a single paper birch seedling or sapling, and yellow birch made up only 1½ percent of the reproduction on these plots. Thus of all the northern hardwood species, the birches—paper birch in particular—are probably the most dependent on a seedbed of exposed mineral soil.

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U. S. Forest Service,
Laconia, N. H.

A 1937 view of nursery in Washington State Capitol Forest, while logging by Mason County Logging Company was still going on, in far background. Good forest practices had been in effect on the 110,000 acres of the Black Hills area since 1899. Only efforts to turn the cutovers into grass and bean land through burning had delayed reforestation on some sections.

State Forester Bernard Orell (right) and Nurseryman Homer Ward look out on same Washington State Capitol scene 15 years later. With fire stopped, the Douglas firs have grown so tall and dense that it is necessary to climb far above the former camera point to bring the nursery into view. The nursery provides seedlings for planting on fire-denuded state and school forest lands.

Reviews

Timber: American Forest Operations and Increase of European Productivity.

Columbia University Press, New York 27, N. Y. 1952. $6.

Ecology of American Forest Species: Erosion and Reafforestation.

Columbia University Press, New York 27, N. Y. 1952. $4.50.

This report, in two parts, is an early 1952 publication of the Timber Committee, Organization for European Economic Cooperation. Under the Marshall Plan, it is the product of a 47-member study mission of European experts to the United States in the summer of 1950.

The broad purpose of the mission, best understood in appraising the report, was to obtain and exchange technical information in forestry and forest products with a view to increasing European productivity. It was the first joint mission of its kind to include a great number of members from 14 different West European member countries. Important throughout the mission was the opportunity to discuss individual problems in a cooperative spirit, and the fostering of team spirit.

The mission was divided into eight specialty groups, each of which was directed to study one of the following subjects:

1. The growing conditions of American species already known in Europe, or which might be introduced into Europe.
2. The re-afforestation of semi-desert and fallow land under difficult climatic conditions.
3. Field and laboratory investigations on soil erosion in forest areas and the preventive measures to be employed.
4. Methods of forest exploitation and timber transport.
5. Organization and technique of sawmills.
6. Organization and technique of veneer and plywood industries.
7. Utilization of inferior and waste wood.
8. Conditioning and marketing of timber.

The first listed report above contains the work on the study subjects four through eight; the second, subjects one through three.

The tour itinerary encompassed the states broadly, and provided for study of all manner of operations and installations. The effective sponsorship by government and industry of the study tour drew the grateful acknowledgement of the many authors of these reports.

Contents of the first forest industries report is chapterized under the headings of General Observations, I-Logging, II-Sawmilling, III-Plywood and Veneer Industry, IV-Utilization of Inferior and Waste Wood, V-Conditioning and Marketing, and Bibliography.

The Part II report contains: I-Introduction, II-Forest Geography of the United States, III-Forest Types, Climate, and Soils, IV-Genetical Consideration, V-Forest Trees and Their Utilization, VI-Growth, Yield, and Thinnings, VII-Cutting Methods and Regeneration, VIII-Conclusions.

Just as in a preceding report on the American poplar, readers in the states will find this report, in both its parts, of great interest and value for the comprehensive treatment of home subjects from the expert European view. The very realization of the study objective made necessary the bringing together of a great mass of American "know-how" from which proper analysis and criticism could be made. The texts are well-written, well-illustrated, and contain extensive bibliographies, some 300 selected references in the case of the forest industries report. American-European comparisons are made in great number, and recommendations for European adaptation unfailingly put forth where the study warranted.

The profession, and leading industries in the fields studied, can ill-afford being without this splendid work. In fact, host foresters and industrialists alike throughout this country should welcome news of these publications in satisfying their interest in the mission efforts.

HUME FRAYER,
U. S. Forest Service.

Third Cumulated Index for the Journal of Foresty.

Compiled by Appalachian Section. 64 pp. Society of American Foresters, Washington, D. C. 1952. $2.

In 1930 was published the *Cumulated Index* of the *Proceedings of the Society of American Foresters* and the *Forestry Quarterly*, the forerunners of the JOURNAL OF FORESTRY, together with the index of the JOURNAL through December 1929. This index was compiled by a committee (C. F. Korstian, chairman) of the Appalachian Section of the Society.

At its annual meeting in 1938 the Section voted to index the volumes of the JOURNAL for the ten-year period 1930-1939, which carried the project through volume 37. George H. Hepting was chairman of the committee which made this compilation.

Again in 1950 the Appalachian Section voted to undertake the preparation of *The Third Cumulated Index*, to cover the 11-year period 1940-1950. A committee was appointed consisting of W. D. Miller, chairman; W. K. Beichler, P. A. Griffiths, R. A. Morin, and Lenthall Wyman.

The material covers leading articles, briefer articles and notes, biographical sketches, obituaries, and committee and meeting reports. It does not include editorials, book reviews, and Society affairs. Each

article is cross-referenced; hence it can be found by subject name as well as by author.

Foresters and workers in allied fields who use the JOURNAL for reference purposes will find this new index valuable, if not indispensable. Together with the first and second indexes, it provides the most complete record available of the professional periodical literature of American forestry.

Forest Entomology.

By Samuel Graham. 3rd. ed. 351 pp. Illus. McGraw-Hill Book Co., New York, N. Y. 1952. $6.

Dr. Graham's new book *Forest Entomology* is a revision of his older book *Principles of Forest Entomology*. The change in the title does not indicate a major redesign in the book although there are several major changes. Like the older editions, the new edition is a book of principles and is not a manual or handbook of forest insects. As in the older editions the author presents the basic information needed by foresters to understand the relation of insects to forests and the methods whereby the forests can be protected. The practical aspects are based on the ecological principles involved in insect population fluctuations and are emphasized as an integral part of forest practice.

In this new volume much of the contents is similar to that in the previous edition. Of course, the old material has been brought up to date and expanded with the newer available information. As in the older edition the contents include the history of forest entomology, the bionomics of insect populations, the various methods of control, and a discussion of the representative insect species which cause the various types of injuries. The new chapter on forest insect surveys, together with the rewritten chapters on chemical control materials and application methods applicable to forest insect control, adds much to the value of the new book. The most useful airplane and air blast methods of application have been emphasized.

This book is a good school text for use in presenting the principles of forest entomology from the forester's viewpoint. The integration of the entomological aspects with other forestry practices is good. It is a well written understandable book which will be widely used as a text. The basic elements of entomology, however, as in the older editions are not included; consequently, the introductory entomological information will have to be supplied from other sources when this book is used as a text.

Part of the chapter on the history of forest entomology appears to be of little interest or importance to most forestry students although the inclusion of the recent legislative developments in the field is very desirable. As a reference book this volume is limited in use for reviewing principles and for obtaining the sources where forest entomological literature can be found. As previously mentioned the book cannot be used to identify an insect causing damage although in a few instances it is helpful in this respect.

ROGER F. ANDERSON,
Duke University.

Conservation in Canada.

By O. M. McConkey. 215 pp. Illus. J. M. Dent & Sons (Canada) Limited. Toronto, 5, Ont. 1952. $3.50.

This interesting textbook attempts to focus the attention of the reader upon the overall problems of the conservation of Canada's natural resources and to point out measures required for improvement. Knowledge of this broad subject as applied to Canada is rather fragmentary, and the author has made many useful comparisons with natural resource exploitation and conservation in other countries and other parts of the world. His wide personal study and travel lend special realism to these examples.

Well over half of this book deals with various aspects of soil and water conservation. The history of agricultural land use and misuse in the various regions of Canada is recounted vividly. The descriptions of soil composition and structure and the effects of wind, water, and different crops upon the soil are graphic and clear. Especially good is the treatment of grasses and legumes which build up the physical properties of the soil and increase its fertility. The reader is clearly informed not only as to what measures should be taken to protect and improve the soil, but also exactly why each such measure will have the desired effect. Water conservation is discussed in connection with the soil, crops, grasses, and forests. The author places special emphasis on the protection of the headwaters and upper watersheds and good cropping practices in the lower watersheds.

It is to be expected that a comparatively short book such as this cannot give adequate coverage to all fields of natural resource conservation. It is primarily a treatise on soil conservation written from the viewpoint of an agriculturist. The major stress is upon soil and water and their interrelationships and upon the action of wind and other climatic factors upon the soil and water supply.

The first chapter is devoted to conservation of all natural resources and deeries wasteful exploitation in general terms. Then there are short chapters toward the end of the book on range land improvement, forest conservation, farm woodlots, marshland, wildlife, fish, recreation, minerals, and oil Quite frankly, these are too cursorily treated to give the reader a clear picture of the issues involved or of specific methods to use in the conservation of these resources. Also, there is no adequate discussion of the economics of the situation with respect to the individual resources.

Despite these shortcomings due to space limitations, every forester should read this book for an out-

standingly clear presentation of the fundamentals of soil and water conservation as applied to Canadian conditions.

LOWELL BESLEY,
University of British Columbia.

Textbook of Wood Technology.
By H. P. Brown, A. J. Panshin, and C. C. Forsaith. Vol. 2. 783 pp. Illus. McGraw-Hill Book Company, New York 36, N. Y. 1952. $10.

If the wood technologist has not paused to consider the depth and breadth of his field as it is today, he may be somewhat astonished to find that the several books recently published in this field still do not constitute a comprehensive exposition.

The second volume of *Textbook of Wood Technology*, which has been anticipated for so long, makes readily available much information that previously was scattered in numerous publications. However, this book is not as exhaustive in treatment of most of the topics as is Volume 1. The scope of Volume 2 is, perhaps too broad to permit thorough coverage within a book of normal size. The subtitle of the book is "The Physical, Mechanical, and Chemical Properties of the Commercial Woods of the United States."

Part 2 on the mechanical properties constitutes the major portion of the text, 490 pages of the total of 760. The chapters on mechanics of wooden beams are thorough and include detailed derivations of formulae. The latter fact, it should be added, is characteristic of many of the topics in the text which involve mathematics.

Welcome additions to the mechanical properties section are chapters on the variations in strength properties of wood, the strength properties of plywood beams and panels, and the holding power of fasteners such as nails, bolts, and timber connectors. Tables for allowable loads and spacings for connectors are included. The chapter on framed structures presents the methods of analysis of stresses and the determination of unknown forces and beam reactions. Chapters on testing procedures and working stresses round out the part on mechanical properties. Detailed data on stress-grade lumber are not presented.

It is probable that many workers in timber mechanics will find excellent use for this book either in teaching or in commercial applications, but the various trade bulletins and association use-books will be of great supplemental value as they have been in the past.

Part 1 deals with the physical properties of wood. Topics discussed are specific gravity, wood-moisture relations, wood in relation to heat, sound, light, and electricity, and the bonding and finishing of wood. Some of these topics are surveyed briefly, but the material presented will be helpful to those who have little previous knowledge of the topic.

The section on bonding of wood is brief (23 pages), but it is concise and stays with basic concepts. The same is true for the section on the relation of wood to electricity. The 27 pages provide a general background for understanding the applications of moisture meters and radio-frequency machines to wood. Dielectric constant, power factor of wood, and radio-frequency heating constitute the bulk of this section.

The discussion on wood-moisture relations attempts to present most of the more common and important phases of the topic. Explanations are brief, sometimes too brief to give a clear and accurate picture. In places, some confusion exists in the use of such terms as *surface of fibrils, amorphorous regions, crystallites*, etc. and their relation to swelling and water below fiber saturation point. This reviewer questions the use of a correction factor of 0.9 for the specific volume of absorbed water in calculating an adjusted volume of wood between fiber saturation and air-dry moisture content. The absorption compression of water in this range is so small that the average specific volume of water in question will be nearer to one than to 0.9.

On page 26 an incorrect value for the average density of absorbed water has been used in computing the specific gravity of oven-dry wood substance in the water-swollen wood. On page 49, in a similar specific gravity computation, the number in the denominator has been calculated incorrectly; so, in subsequent problems using this factor, the answers are slightly in error. What is more surprising are the statements made on page 51 that these densities of solid wood substance are derived by different methods. Actually, there is no basic difference, but both values were computed erroneously. When calculated correctly, by either equation, the values are the same, as they should be. Concerning this topic, it would be of help to point out the numerical value of the specific gravity of saturated cell-wall substance base on the weight of water and wood combined.

On page 35, in problem 1, the wording in the first line does not fit the problem. On page 147 the decimal point has been misplaced in the value for the sound absorptive capacity of the average chair. Other errors were noted. In general, the errors in this text detract from its usefulness to an unfortunate degree.

Part 3, The Chemical Properties of Wood, is a brief survey, in 40 pages, of cell-wall and extraneous components of wood, chemical treatments of wood, and thermal reactions of wood. This portion of the text is primarily for those who wish to obtain a superficial knowledge in the topics just mentioned.

The list of references for each chapter is small and, presumably, is limited to the more important and comprehensive works in the field. The extensive use of problems, with methods and answers, is a commendable feature of the text.

HARVEY D. ERICKSON,
University of Washington.

Trees and Shrubs in Eastern North America.

By Benjamin Blackburn. 358 pp. Illus. Oxford University Press, New York 11, N. Y. 1952. $6.

To understand properly the nature and scope of this book, the subtitle is also necessary, viz: "Keys to the wild and cultivated woody plants growing in the temperate regions exclusive of the conifers."

There are eight line cuts, the first one illustrating poison-ivy, poison-oak, and poison-sumac, and the other seven, showing various features of leaves, flowers, and twigs, used in the keys which comprise most of the book. There is also a one-page preliminary key for separating "Woody Plants with leaves evident" from "Woody Plants with leaves not clearly evident. . ."

The next 66 pages present 5 separate keys, mostly to genera, and designated I Plants with scale-like, needle-like, or linear leaves, II Plants with opposite or whorled simple leaves, III Plants with opposite or whorled compound leaves, IV Plants with alternate simple leaves, V Plants with alternate compound leaves. Except for a selected bibliography, glossary, and index, the rest of the book consists of an alphabetical arrangement of the genera, and under each, there is a key to "species and variations" of which "somewhat more than 2,300" are included in the book.

Unlike many botanical keys which use indiscriminately leaves, flowers, and fruit, so that one must sit throughout a growing season, or perhaps several (!) waiting to obtain flowers and fruit, these keys are based chiefly upon features of *leaves and branchlets of the current season*. It is much more difficult to construct such keys, but they are more value to the user, particularly the layman for whom the essentially nontechnical language of these keys is especially suited.

All keys with the exception of a few "conspectus" ones, are dichotomous, and not difficult to follow, even though the reviewer thinks that it is better to have the two statements of coordinated rank, one directly under the other instead of separated, somethimes by a page or more, in long keys of this kind. To compensate for any such difficulties, however, the author has conveniently indicated the page number where the other member of the pair may be found, when both are not on the same page. A unique and helpful feature of the keys is the inclusion under each species, of its approximate range as "e N America" or "se United States." Dimensions given in the keys are in the metric system.

Only one who has ever tried to construct workable keys can appreciate the amount of time and effort in turning out some 300 pages of them! The reviewer's sampling of a few of them has found little to question except perhaps the repeated phrase "leaves not as above" instead of a more definite positive assertion.

Certainly this book deserves a place in the useful dendrological literature on the native and introduced broadleaved woody plants of eastern North America.

W. M. HARLOW.

Silvicultural Systems.

By R. S. Troup. Second Edition. 216 pp. Illus. Oxford University Press, New York, N. Y. 1952. $5.

The first edition of Troup's well-known book appeared in 1928. Since then it has been widely used throughout the English speaking forestry world.

This, the second edition, is primarily a reprint of the first. The excellent illustrations and general attractive presentation has been preserved. Throughout the text the editor, E. W. Jones, of the Imperial Forestry Institute at Oxford has made minor alterations and also added a new chapter, "Developments of the Last Twenty Years," but Dr. Jones has made changes only where he felt that the late Professor Troup himself would have done so.

Silvicultural Systems leans heavily on central European silviculture although many references are given to forestry in other parts of the world, and it is probably the most international silvicultural textbook in existence. It is based upon Troup's wide travels and his high scholarly qualities. He has carefully and accurately analyzed the central European silvicultural reproduction methods, and systematized these exceedingly well. He gives an excellent and balanced presentation of trends in European silviculture and points out mistakes made during the past century. The section "Experience of the Clear-cutting System in Saxony and Switzerland" is perhaps the most accurate story of this important subject that has appeared in the English language.

The weakness of the book, to the mind of the reviewer, is the emphasis of the systems rather than on the forest and the conditions which have led to these numerous systems. Behind each system lies a knowledge of the ecologic and economic conditions under which a particular forest type functions. Usually, many observations or experiments have laid the foundation upon which the systems were built, and a particular system would only operate successfully where these particular conditions exist. The immature reader is perhaps tempted to try some of these systems without fully realizing that the only road forward to good silviculture is a full understanding of the ecologic and economic conditions of the particular stand or forest in question before any systems can be developed or perhaps adapted.

Troup, and now also his co-worker Jones, seem likewise to identify silviculture with forest ecology. He writes, "The development of the various silvicultural systems of the present day has been brought about by a combination of silvicultural considerations on the one hand and economic conditions on the other."

The facts are that silviculture always has an economic objective, namely, the benefit of man, and it

is always based upon economic considerations. If this was not the case we might plant, for example, using a spacing of 6" by 6" or more fully copy nature's reproduction methods which could cost many hundreds dollars per acre.

In spite of these comments, Troup's book, as presented by Dr. Jones, is a most valuable handbook and should be read by every forester.

SVEND O. HEIBERG.

Understanding Heredity: An Introduction to Genetics.

By Richard B. Goldschmidt. 228 pp. Illus. John Wiley and Sons, Inc., New York 16, N. Y. 1952. $3.75.

This book is one of a number published in the past few years, designed to acquaint the educated and interested layman with the principles of heredity. In this reviewer's opinion, it is one of the best, and its merit lies in the fact that the author has succeeded in achieving a general and fundamental coverage of the whole field in a small, highly readable volume.

The first eleven chapters cover the essential features of cells and chromosomes in relation to heredity, and the action of genes in heredity and development. Throughout, the treatment is marked by a masterful sense of exclusion of nonessentials. Then comes the final chapter, entitled "a glimpse of more technical facts and problems of genetics." This is followed by a brief list of recent, readily available, texts and special works in genetics, and a six-page glossary. There is a brief section of problems which appear helpful for driving home the points raised in each chapter, but it would probably not be adequate for any but the most perfunctory course in genetics.

What does this book offer the forester who wishes to acquire a knowledge of genetics as one of his professional tools? It can serve as a stimulating introduction and as a firm foundation for reading and study along more technical lines. If a book is to do this job successfully, it must be able to overcome a tendency among professionally trained people to hold special fields other than their own in too much awe. Often the key to success in reaching people in other fields is the avoidance of excessive use of technical jargon, the adequate explanation of that which must be used, and the expression of ideas in the most general terms consistent with clarity. If these requirements are met without talking down and the use of shaky analogies, the book is a good one—as this one is.

J. W. DUFFIELD,
Institute of Forest Genetics, California Forest & Range Experiment Station.

Forest Yield Taxes.

By Ralph W. Marquis. 50 pp. Circular 899. U. S. Dept. Agric., Washington 25, D. C. 1952.

You may already know the difference between a yield tax and a severance tax, but if you own woodlands or are otherwise concerned with forest property taxation you will want to add this booklet to your library. The author clearly demonstrates his authority to discuss the subject.

For more than a century the application of the general property tax has been criticized. Although the effects of the ad valorem tax have been greatly exaggerated, it must be recognized that it tends to promote rapid liquidation of mature timber, instability of forestland ownership, and failure to provide for a new crop of trees. Property taxes have not been an important obstacle to forestry in recent years, but assurance is lacking that this happy situation will continue indefinitely.

Various types of special tax laws have been enacted by many states to modify or supersede the property tax on forest land. Since 1910 the yield-tax principle has been the basis for most new legislation. Yield-tax laws have been enacted by 19 states and are still effective in 14. Other states are at present either studying or actively promoting yield-tax legislation.

Part of the disappointment with yield-tax laws may be due to expecting too much of them. There are other obstacles to forestry. Nevertheless, more good forestry is being practiced than would have been the case if yield-tax provisions had not been available. The conclusion that many of the laws have been almost wholly ineffective does not prove that the yield-tax principle is wrong. Future yield-tax legislation, if based on effective analysis of the problems, may bring more encouragement to good forestry.

The purpose of the study reported in this booklet is to establish the elements of a helpful and effective yield-tax law. A single model law is not desirable. There are differences in the physical and economic environments of the states. It is possible, nevertheless, to lay down the general principles of what a good yield-tax law should do. Yield-tax laws should cover a larger aggregate area than they now do. A yield-tax law should be simple; it should be adapted to present methods of forest management and should provide continuity of relationship between the owner and the taxing jurisdiction.

The yield-tax law should provide for equitable taxation but should not disturb local revenues unduly. It should have popular support. Under an optional law, an owner should be permitted to withdraw his land from classification if he wants to put it to some other purpose. The state should have assurance that the use of the land will be consistent with the purpose of the law.

Lawmakers will benefit from careful attention to the technical analysis presented. Study of this report will enable them to accelerate the general application of good forest-property taxation.

H. B. SHEPARD,
Federal Reserve Bank of Boston.

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Compiled by MARTHA MEELIG, *Librarian, The New York State College of Forestry*

Range Management Section Compiled by FRANCES FLICK, *Library, U. S. Department of Agriculture*

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Society Affairs

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International Paper Company
Mobile 9, Ala.

PERRY A. THOMPSON
12 Elkin Court
San Rafael, Calif.

RUTHFORD H. WESTVELD
Department of Forestry
University of Missouri
Columbia, Mo.

Preliminary Program of C.I.F.-S.A.F. Meeting

There follows the preliminary program of the joint meeting of the Canadian Institute of Forestry and the Society of American Foresters in Montreal, November 17-20. The October issue will contain the final program of topics and speakers.

Members of the two societies and their guests are welcome to attend all open meetings, including the technical sessions. Although the meeting officially begins on Monday, November 17, the only open session that day is the technical session on forestry education, primarily of interest to those engaged in professional forestry instruction. The first (opening) general session is scheduled for the morning of Tuesday, November 18.

The theme of the meeting is "Trends in North American Forestry." All foresters, and friends of forestry everywhere, are cordially invited to attend.

Technical Session on Forestry Education

Monday Morning, Nov. 17

Robert P. Holdsworth, Chairman
J. W. B. Sisam, Co-chairman

1. "Trends in Forestry Education in North America." Myron Krueger, School of Forestry, University of California, Berkeley, Calif.

2. Panel: Certain Aspects of the Professional Forestry Curriculum.

Moderator: L. Z. Rousseau, Faculty of Forestry, Laval University, Quebec, Que.

"The Role of the Humanities and Other Liberal Courses in the Professional Forestry Curriculum." J. W. Barret, College of Forestry, State University of New York, Syracuse, N. Y.

"The Role of the Basic Sciences in the Professional Forestry Curriculum." Arnold D. Rhodes, Forestry Department, University of Massachusets, Amherst, Mass.

"The Place of Vocational Training in the Professional Forestry Curriculum." Lowell Besley, Faculty of Forestry, University of British Columbia, Vancouver, B. C.

Discussion: J. Miles Gibson, Faculty of Forestry, University of New Brunswick, Fredericton, N. B.

Monday Afternoon, Nov. 17

1. "The Role of Ranger Schools in Canada and the United States." R. W. Blenis, Maritime Ranger School, Fredericton, N. B.

Discussion: C. Eugene Farnsworth, College of Forestry, State University of New York, Syracuse, N. Y.

2. "The Role of Wood Utilization and Similar Curriculum in Forestry Education." William Kynoch, School of Natural Resources, University of Michigan, Ann Arbor, Mich.

Discussion: George A. Garratt, School of Forestry, Yale University, New Haven, Conn.

3. "Interpreting Professional Forestry to the Layman." J. L. Van Camp, Canadian Forestry Association, Montreal, Que.

Discussion: Paul A. Herbert, Division of Conservation, Michigan State College, East Lansing, Mich.

4. "Factors Affecting Successful Job Performance by the Young Forester." Walter F. McCulloch School of Forestry, Oregon State College, Corvallis, Oreg.

Discussion: David Campbell, International Paper Company, Cullendale, Ark.

5. "The Role of the General Forestry Course in the Professional Forestry Curriculum." Richard J. Preston, School of Forestry, North Carolina State College, Raleigh, N. C.

Discussion: Robert I. Ashman, Department of Forestry, University of Maine, Orono, Maine.

Executive Meetings

Monday, Nov. 17

The S.A.F. Council will hold executive meetings during the morning and afternoon.

The C.I.F. Board of Directors will hold a business meeting.

There will be a joint reception and dinner during the evening for the S.A.F. Council and the C.I.F. Board of Directors.

An informal meeting of those interested in public relations will be held this evening. The time and place will be announced later.

Committee meetings of the two societies and meetings of cooperating organizations to be held this evening will be announced later.

First General Session

Tuesday Morning, Nov. 18

D. A. Macdonald, Chairman

Address of Welcome. K. G. Fensom, president of the Canadian Institute of Forestry, Vancouver, B. C.

Response. George L. Drake, president of the Society of American Foresters, Shelton, Wash.

Plan of the meeting and announcements. W. A. E. Pepler, general chairman, Montreal, Que.

"Welcome to Province of Quebec in the Centenary Year of Laval University." Avila Bedard, Laval University, Quebec, Que.

Address on the Theme of the Meeting. "Trends in North American Forestry." A. W. Bentley, consulting forester, Victoria, B. C.

Joint C.I.F.-S.A.F. Luncheon

Tuesday, Nov. 18

Toastmaster, E. M. Little, Canadian Pulp and Paper Association, Montreal, Que.

Address, Hon. Louis S. St. Laurent, Prime Minister of Canada.

Society Affairs Session

Tuesday Afternoon, Nov. 18

George L. Drake, President
E. L. Demmon, Vice President

Report of the President, George L. Drake.

Report of the Executive Secretary, Henry Clepper.

S.A.F. Committee reports.

Open forum discussion.

C.I.F. Business Meeting

Tuesday Afternoon, Nov. 18

K. G. Fensom, President
D. V. Love, Secretary

Agenda to be announced later.

Alumni Get-togethers Motion Pictures Committee Meetings

Tuesday Evening, Nov. 18

This evening has been held open for

1. Forestry school alumni dinners and get-togethers,
2. Meetings of committees of the two societies,
3. Meetings of related organizations,
4. Showing of forestry motion pictures.

Technical Session on Silviculture

Wednesday Morning, Nov. 19

Harold J. Lutz, Chairman
George S. Allen, Co-chairman

1. "Forest Genetics: Achievements to Date and Future Possibilities." Jonathan W. Wright, Northeastern Forest Experiment Station, Upper Darby, Pa.

Discussion: C. C. Heimberger, Division of Research, Ontario Department of Lands and Forests, Maple, Ont.; and E. W. Littlefield, Division of Lands and Forests, New York Conservation Department, Albany, N. Y.

2. "Present and Future Trends in Forest Entomology." R. E. Balch, Division of Forest Biology, Dominion Entomological Laboratory, Fredericton, N. B.

Discussion: H. A. Richmond, Division of Forest Biology, Dominion Entomological Laboratory, Victoria, B. C.; and R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, New Haven, Conn.

3. "The Importance of Timber Quality as a Goal in Silviculture." Clifford H. Foster, Pack Forest, Warrensburg, N. Y.

Discussion: Benson H. Paul, Forest Products Laboratory, Madison, Wis.; and W. R. Adams, College of Agriculture, University of Vermont, Burlington, Vt.

4. "The Classification and Evaluation of Site for Forestry." G. Angus Hills, Department of Lands and Forests, Southern Research Station, Maple, Ont.

Discussion: S. O. Heiberg, College of Forestry, State University of New York, Syracuse, N. Y.; and S. P. Gessel, College of Forestry, University of Washington, Seattle, Wash.

Wednesday Afternoon, Nov. 19

Symposium on the Silvicultural Management of Spruce-Fir

1. "Ecology and Silviculture of Spruce-Fir in the East." Marinus Westveld, Northeastern Forest Experiment Station, Upper Darby, Pa.

Discussion: Myles Standish, Brown Company, Berlin, N. H.; and Francois Matte, Donnacona Paper Company, Ltd., Quebec, Que.

2. "Logging and Utilization in Spruce-Fir in the East." R. S. Johnson, Mersey Paper Company, Ltd., Liverpool, Nova Scotia.

Discussion: Leif Holt, Pulp and Paper Research Institute of Canada, Montreal, Que.; and I. C. M. Place, Dominion Forestry Branch, Fredericton, N. B.

3. "Ecology and Silviculture of Spruce-Fir in the West." Russell K. LeBarron, California Forest and Range Experiment Station, Berkeley, Calif.; and George M. Jemison, Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Mont.

Discussion: Bert R. Lexen, U. S. Forest Service, Washington, D. C.; and Jesse H. Buell, U. S. Forest Service, Fort Collins, Colo.

4. "Logging and Utilization of Spruce-Fir in the West." Lawrence A. deGrace, British Columbia Forest Service, Aleza Lake, B. C.

S.A.F. Consulting Foresters List to be Published in January JOURNAL

November 1, 1952 is the deadline for consulting foresters to apply for listing in the Society of American Foresters' List of Consulting Foresters which is to be published next in the January 1953 JOURNAL OF FORESTRY.

Minimum requirements for listing are membership in the Society and the designation of fields of specialization commensurate with the consultant's training and experience as shown in the official Society records.

Consulting firms will be listed if one or more of the partners or employees are members of the Society and capable of performing the services offered. In such cases, those individuals' names will appear in the listing.

Persons and firms in the S.A.F. List of Consulting Foresters which was published on pages 59-65 of the January 1952 JOURNAL have been contacted by mail to obtain corrections or revisions of their listings.

Members who are doing consulting forestry work and who have not been listed previously are invited to apply for inclusion in the S.A.F. list. They should provide complete information concerning address, specialization, and territory served, following the form used in the List of Consulting Foresters published in the January 1952 JOURNAL OF FORESTRY. A limited number of reprints of that list is available for free distribution.

November 1, 1952 is the last date on which listings will be accepted for publication in the January 1953 list.

Discussion: William Lehrle, British Columbia Forest Service, Kamloops, B. C.; and D. I. Crossley, Dominion Forestry Branch, Calgary, Alta.

Technical Session on Forest Management

Wednesday Morning, Nov. 19

Gordon Godwin, Chairman
E. B. Moore, Co-Chairman

1. "Forest Management in Ontario." Howard Kennedy, consulting forester and engineer, Ottawa, Ontario.

Discussion: B. F. Avery, The K. V. P. Company, Ltd., Espanola, Ontario; and J. W. McNutt, William Milne & Sons, Ltd., Temagami, Ontario.

2. "Planning for Sustained Yield Operations." George B. Amidon, Minnesota and Ontario Paper Company, International Falls, Minn.

Discussion: William J. Brown, Kimberly-Clark Corporation, Neenah, Wis.

3. "Forest Management in British Columbia." C. D. Orchard, British Columbia Forest Service, Victoria, B. C.

Discussion: F. D. Mulholland, Elk Falls Company, Ltd., Ladysmith, B. C.; and Lowell Besley, Faculty of Forestry, University of British Columbia, Vancouver, B. C.

Wednesday Afternoon, Nov. 19

1. "Prescribed Burning as a Tool of Forest Management in the Northeastern States." Silas Little, Jr., Northeastern Forest Experiment Station, New Lisbon, N. J.

Discussion: David M. Smith, School of Forestry, Yale University, New Haven, Conn.

2. "Industry Encouragement to Woodlot Management." F. A. Harrison, Canadian International Paper Company, Montreal, Que.

Discussion: J. F. Walker, The Ontario Paper Company, Ltd., Gore Bay, Ontario; and Roch Delisle, Forest Extension Bureau, Dept. of Lands and Forests, Quebec, Que.

3. "Problems Involved in Applying a Practical Forest Program in Small Forest Holdings." Michael Pochan, Jr., Connwood, Inc., Cheshire, Conn.

Discussion: David H. Hanaburgh, consulting forester, Buchanan, N. Y.

Technical Session on Economics and Taxation

Wednesday Morning, Nov. 19

Ralph W. Marquis, Chairman
J. Miles Gibson, Co-chairman

Symposium: The relation of changing economic conditions and other factors to:

1. Public Policy Regarding Forest Lands.

In the United States. Edward C. Crafts, U. S. Forest Service, Washington, D. C.

In Canada, Murray B. Morison, Division of Timber Management, Ontario Department of Lands and Forests. Toronto, Ont.

Discussion:

2. Forest Practices on Privately Owned and Privately Operated Public Lands.

In the United States. David T. Mason; Mason, Bruce and Girard, Portland, Ore.

In Canada. A. W. Bentley, consulting forester, Victoria, B. C.

Discussion.

Joint C.I.F.-S.A.F. Dinner

Wednesday Evening, Nov. 19

(Preceding the dinner there will be an informal reception for all members, their ladies, and guests.)

Toastmaster, K. G. Fensom, president, C.I.F.

Presentation of the Sir William Schlich memorial medal and the Gifford Pinchot medal, George L. Drake, president, S.A.F.

Address, A. W. Trueman, president of the University of New Brunswick, Fredericton, N. B.

Dinner music. French Canadian folk songs.

Technical Session on Forest Utilization

Thursday Morning, Nov. 20

J. H. Jenkins, Chairman
R. C. Fraunberger, Co-chairman

1. "Effect on the Forest of Recent Pulp and Paper Developments in British Columbia." T. G. Wright, Canadian Forest Products, Ltd., Vancouver, B. C.

Discussion: Edwin Heacox, Weyerhaeuser Timber Company, Tacoma, Wash.; and Clarence Richen, Crown-Zellerbach Corporation, Portland, Ore.

2. "Effect of Water Transportation on Forest Utilization in Eastern Canada." R. D. Collier, Pulp and Paper Research Institute of Canada, Montreal, Que.

Discussion: I. F. Fogh, Canadian International Paper Company, Montreal, Que.; and J. F. Sharpe, Division of Timber Management, Department of Lands and Forests, Toronto, Ont.

3. "Good Logging Practices Increase Forest Yields." J. A. Doyle, Division of Forest Products Laboratories, Department of Resources and Development, Ottawa, Ont.

Discussion: C. R. Silversides, Abitibi Power and Paper Company, Ltd., Toronto, Ont.; and L. R. Seheult, University of New Brunswick, Fredericton, N. B.

Technical Session on Recreation, Wildlife and Range Management

Thursday Morning, Nov. 20

Edward P. Cliff, Chairman
C. H. D. Clarke, Co-chairman

1. "Wildlife Management in the Yukon Territory." Fred Fraser, Yukon Administration, Dawson, Yukon.

Discussion.

2. "The British Columbia Forest Service in the Field of Recreation in Parks and Provincial Forests." C. D. Orchard, British Columbia Forest Service, Victoria, B. C.

Discussion: James Smart, National Park Service, Ottawa, Ont.

3. "The Coordination of Silvicultural Systems and Wildlife Management." C. David Fowle and D. R. M. Scott, Division of Research, Department of Lands and Forests, Toronto, Ont.

Discussion: Stanley G. Fontanna, School of Natural Resources, University of Michigan, Ann Arbor, Mich.

4. "Examples of Wildlife Habitat Improvement through Modification of Forest Practices in the Lake States." Ernest Swift, Wisconsin Conservation Department, Madison, Wis.

Discussion: J. A. Brodie, Division of Timber Management, Ontario Department of Lands and Forests, Toronto, Ont.

5. "Recreation Plans for the Superior National Forest (the U. S. Portion of the Quetico-Superior Areas)." Galen W. Pike, U. S. Forest Service, Duluth, Minn.

Discussion: Keith Acheson, Ontario Department of Lands and Forests, Kenora, Ont.

6. "Forest Grazing in the United States." W. L. Dutton, Division of Range Management, U. S. Forest Service, Washington, D. C.

Discussion: Clinton H. Wasser, School of Forestry and Range Management. Colorado A & M. College, Fort Collins, Colo.

Technical Session on Public Relations

Thursday Morning, Nov. 20

Ralph Unger, Chairman
M. R. Wilson, Co-chairman

1. "Industry Looks at Public Education in Forestry." Lowell Besley, University of British Columbia, Vancouver, B. C.

Discussion: James Stevens, West Coast Lumbermen's Association, Seattle, Wash.

2. "Television and Forestry." Floyd E. Carlson, College of Forestry, State University of New York, Syracuse, N. Y.

Discussion: William Bergoffen, U. S. Forest Service, Washington, D. C.

3. Luncheon speaker: Fred Palmer, Earl Newson Co., New York.

An informal meeting of those interested in public relations will be held in the evening of Monday, November 17. The exact time and place will be announced later.

Second General Session

Thursday Afternoon, Nov. 20

W. A. E. Pepler, Chairman

1. Session reports.
2. Discussion.
3. Summary of the meeting, George A. Garratt, School of Forestry, Yale University, New Haven, Conn.
4. Adjournment.

Ladies' Activities

A special room in the Mount Royal Hotel will serve as a lounge and information center for ladies attending the meeting. Coffee will be served during the morning. Members of the Ladies Committee will provide information on shopping facilities, sightseeing, and local places of interest.

A bus tour of the city has been arranged for Tuesday afternoon, November 18. Following this tour, there will be a reception by Mayor Houde and the City of Montreal at the Montreal Botanical Gardens.

Ladies are especially invited to attend the reception and dinner of the two societies on the evening of Wednesday, November 19.

Hotel Reservations

In requesting hotel reservations, members should state that they will attend the joint meeting of the Canadian Institute of Forestry and the Society of American Foresters, and give the date and approximate time of arrival.

Usually reservations are not held after 6 p.m., hence guests who expect to arrive after that hour should obtain confirmation from the hotel that rooms will be available. Usually, the number of rooms at the minimum rate, especially single rooms, is limited, hence hotels may confirm reservations at the next highest rate, if no room is available at the rate requested.

Since rooms with twin beds will be easier to obtain than single rooms, members are urged to team up when possible. Moreover, the rate per person may be less. Early reservations are advised.

Remember that the first general session opens on the morning of November 18. The first technical session—forestry education—will be held on November 17; this will be the only open meeting on November 17.

Mount Royal Hotel

The headquarters hotel for the meeting is the Mount Royal, 1455 Peel Street. This hotel contains 1100 rooms and adequate accommodations are assured for all those who wish to attend. Daily rates are as follows:

Single room with bath: $6, $6.50, $7.50, $8.50, and $9.50.

Double-bed room with bath for two: $9, $9.50, $10.50, $11.50, and $12.50.

Twin-bed room with bath for two: $9.50, $10.50, $11.50, $12.50, and $14.50.

Three persons in two rooms with bath: $15, $16, $19, and $21.

Three persons in one room with bath: $13.50, $14.50, and $15.50.

Suites for two persons: $21, $22, $24, and $28.

Other Hotels

Affiliated with the Mount Royal is the Laurentian Hotel, located at Dorchester and Windsor Streets, on Dominion Square. The Laurentian is five blocks from the Mount Royal, within easy walking distance. It is a large modern hotel (1000 rooms). The rates are $5 up for single room with bath; $8.50 up for double room with bath.

Other good hotels in Montreal, all within a ten-minute walking distance of the Mount Royal, are the following:

The Windsor Hotel (700 rooms), Windsor and Dorchester Streets, is four blocks from the Mount Royal. Rates are $6 up for single room with bath; $9 up for double.

The Queen's Hotel (500 rooms), Windsor and St. James Streets, is six blocks from the Mount Royal. It is a less expensive hotel. The rates are $4 up for single room with bath; $7 up for double.

Hotel Berkeley (100 rooms), 1188 Sherbrooke Street West; four blocks from the Mount Royal. The rates are $4.50 up for single room with bath; $8 up double.

Hotel de La Salle (175 rooms), 1240 Drummond Street; five blocks from the Mount Royal. Rates are $5 up for single room with bath; $8 up double.

Montreal has other hotels and numerous tourist lodges. Lists of these may be obtained from the Montreal Tourist and Convention Bureau, 923 Dominion Square Building, 1010 St. Catherine Street West.

Section Manual Reprinted

Early in 1950 Section Manuals were prepared and sent to Society officers, Council, Section officers, Chapter chairmen, and Section representatives at accredited schools of forestry. This Manual was primarily designed for Sections and Chapters to aid them in preparing membership applications and handling Section business.

The Manual has been, and should continue to be, an effective tool in the administration of Section business. From time to time revisions have been made and sent to holders of Section Manuals. Major revisions were made in the fall of 1951 under "Membership." Holders of Section Manuals should check now to see that they have received and inserted in the Manual this completely revised section which numbers thirty pages. In May a combined Contents and Index was also sent for inclusion in the Manual.

The Section Manual has been reprinted. Copies are available upon request to replace lost or worn copies, and to supply officers of recently organized Chapters. It is assumed that officers have passed their copies on to their successors.

The reprinted Manual does not have an outside cover. It is suggested that Sections provide for their officers a stiff-backed binder which gives greater flexibility; permits the Manual to be opened so that its contents lie flat; and prevents the material from becoming dog-eared.

Sponsor Statements No Longer Needed for Affiliates

At its June meeting the Council amended Bylaw 19 to provide for the elimination of sponsor statements for Affiliate Members (Class A).

Graduates of nonaccredited forestry schools may apply for the Affiliate grade (Class A) if they have completed all of the required basic forestry courses which must be included for a forestry curriculum to be approved. According to the heads of the following forestry schools these requirements have been met:

Stephen F. Austin State College
University of Connecticut
Louisiana Polytechnic Institute
Michigan College of Mining and Technology
University of New Hampshire

Oklahoma Agricultural and Mechanical College
Virginia Polytechnic Institute
State College of Washington
University of the South

Applicants for the Affiliate grade (Class A) from such schools need complete only the first six items on an application form. The application should be forwarded to the membership chairman of the respective Section for endorsement.

Affiliate Members (Class A) are eligible to apply for advancement to the Junior grade (Class B) after two years of qualifying forestry experience subsequent to election to the Affiliate grade.

Arthur B. Meyer Named Editor of Forestry Publications

The Council of the Society at its mid-year meeting in June unanimously approved the appointment of Arthur B. Meyer of Jefferson City, Mo. as full-time editor of the JOURNAL OF FORESTRY and other Society publications.

Mr. Meyer assumes his duties with the Society on September 4, replacing Albert G. Hall who since January 1950 has been serving as editor on a part-time basis. Mr. Meyer thus becomes the first full-time editor for the Society, an objective of the Council since 1948 when approval was given to "the establishment of a staff office on publications with qualified personnel, as the next major expansion of the budget."

A forester, with considerable writing and editing experience, Mr. Meyer, aged 36, is a native of Missouri and a graduate in forestry of the Michigan State College (1938).

With the exception of three years, November 1942 to November 1945, including 14 months in the Pacific Theatre as a photographic interpretation officer, and a brief period in private business, Mr. Meyer has been employed by the Forestry Division of the Missouri Conservation Commission. He leaves the position of assistant state forester, to which he was appointed in 1949, to come with the Society.

Mr. Meyer has demonstrated his competence as an editor and writer and is a contributor to a number of forestry, conservation, and outdoor publications including the JOURNAL OF FORESTRY, *American Forests*, and the official organ of the Missouri Conservation Commission, *Missouri Conservationist*.

While Mr. Meyer's principal duties will be with the JOURNAL OF FORESTRY, he will be responsible also for the writing and editing of other publications for the Society and will assist in the preparation of publicity. Among other Society publications now authorized and requiring experienced editorial assistance are:

1. The combined eastern and western *Forest Types of the United States and Canada*.
2. *The Foresters' Field Manual*, now in the process of completion by a special committee.
3. A professional guidance booklet for prospective forestry students.
4. Revision of the *Constitution and Bylaws*.
5. *Grade Standards for Forest Planting Stock*, now in preparation by a special committee.
6. Revision of the style manual for contributors to the JOURNAL OF FORESTRY.
7. Professional and public relations articles.

Mr. Meyer will also be available to work with the committees of the Society, the Sections, and the Divisions in the editing and publication of technical reports. When requested he will help members of the Society in their preparation of manuscripts for the JOURNAL.

Another field of activity for the new editor will be developing and carrying out projects to increase the circulation of the JOURNAL.

Henry Clepper, who as executive secretary of the Society, has served as managing editor of the JOURNAL since 1937, will continue to guide the policy of the JOURNAL and will be responsible as managing editor to the Council and the members for its publication.

Miss L. A. Warren will continue as business manager in the position she has very ably handled for a number of years, and Lloyd Thorpe of Seattle will continue as advertising representative.

ARTHUR B. MEYER . . .
the Society's new editor.

No early changes in the editorial board are contemplated, although some associate editors who have rendered long and faithful service to the JOURNAL have asked to be relieved of their duties. The policy of rotating associate editors has been followed throughout the JOURNAL'S existence in order to permit the widest possible participation in Society activities by the largest number of qualified members.

In announcing Mr. Meyer's appointment, the Council desires to express its appreciation to the present associate editors for their invaluable contributions they have rendered the profession, and to Mr. Hall, whose direct responsibility for the editorial contents of the JOURNAL will cease with the October issue.

Forest Soils Course

A forest soils short course, sponsored by the Schools of Forestry and Agriculture, Oregon State College and the Douglas Fir Forest Soils Committee will be given in Corvallis, November 6-8. Material to be covered will include the chemical, physical and biological aspects of forest soils, geology of parent materials, general problems of soil and land classification, watershed management, and a discussion of forest soils problems being investigated by state and federal agencies and private industry. The purpose of the course is to acquaint foresters with the problems and current activities in the field of forest soils. Further information may be obtained from C. T. Youngberg, Dept. of Soils, Oregon State College, Corvallis, Ore.

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Candidates for Membership

Candidates for admission, advancement, or reinstatement whose membership applications were received in the Society office during the month of July are listed below.

Action regarding the eligibility of these candidates will be taken by the Council as of October 1, 1952. Any communications from voting members relating to the membership eligibility of any of these candidates should be received in the Society office prior to that date.

Allegheny Section

Member Grade

Gleim, G. H., Plant Supv., Hunter-Wilson Dist. Co., Inc., Oil City, Pa.; State Univ. of New York, B.S.F., 1943. (Junior, 1949).

Appalachian Section

Junior Grade

Conger, E. F., Cruiser Forester, E. F. Conger Co., Staunton, Va.; Biltmore Forest School, B.F., 1910.

Williams, W. H., Woodlands Div., International Paper Co., Georgetown, S. C.; N. C. State, B.S.F., 1950.

Member Grade

Matthews, J. A., Area Forester, Riegel Woodlands, Southern Pines, N. C.; N. C. State, B.S.F., 1937. (Junior, 1946).

Tupaez, E. K., Photo Interpreter, International Paper Co., Georgetown, S. C.; State Univ. of New York, B.S.F., 1943. (Junior, 1946).

Central States Section

Junior Grade

Jensen, C. E., Forester, U.S.F.S., Columbus, Ohio; Mich. State, B.S.F., 1943; M.F., 1948.

Member Grade

Zweig, R. L., Dist. Forester, Dist. Forester's Office, Salem, Ind.; Purdue Univ., B.S.F., 1940. (Junior, 1946).

Affiliate Grade

Peterson, R. E., Route No. 1, Covington, Ohio; Mich. Mining and Tech., B.S., (Forestry), 1950.

Columbia River Section

Junior Grade

Smith, J. R., Asst. Forester, Oregon Lbr. Co., Dee, Oreg.; Iowa State, B.S.F., 1951.

Inland Empire Section

Member Grade

Pitkin, F. H., Nurseryman, Univ. of Idaho, Moscow, Idaho; Univ. of Idaho, B.S.F., 1939. (Junior, 1946).

Kentucky-Tennessee Section

Junior Grade

Jones, B. M., 320 Melrose St., Bristol, Tenn.; Univ. of Fla., B.S.F., 1952. (Student, 1952).

New England Section

Junior Grade

Whipple, T. G., R.F.D. No. 2, Winchester, N. H.; N. C. State, B.S.F., 1952. (Student, 1952).

Affiliate Grade

Gibbs, C. B., Jr. Forester, N. H. Forestry and Recreation Comm., Concord, N. H.; Univ. of N. H., B.S., (Forestry), 1950.

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK

Parslow, D. F.

Member Grade

Bisogni, J. J., Forester, N. Y. State Cons. Dept., Catskill, N. Y.; Univ. of Mich., B.S.F., 1942. (Junior, 1946).

Northern California Section

Junior Grade

Groves, G. M., U.S.F.S., Trinity Center, Calif.; Oregon State, B.S.F., 1952. (Student, 1952).

Member Grade

DeMoisy, R. G., Woods Mgr., Calif. Div., M & M Wood Working Co., Eureka, Calif.; Utah State, B.S.F., 1938; Oregon State, M.F., 1946. (Junior, 1946).

Northern Rocky Mountain Section

Student Grade

MONTANA STATE UNIVERSITY

Addor, E. E.; A. B. Coates; D. W. Saltsman

Member Grade

Hofferber, C. M., Asst. Rgr., U.S.F.S., Helena, Mont.; Mont. State, B.S.F., 1947; Univ. of Mich., M.F., 1950. (Junior, 1948).

Hutton, G. A., Forester, Northern Rocky Mt. Forest and Range Exp. Sta., Missoula, Mont.; Colo. A & M., B.S.F., 1947. (Junior, 1948).

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Fine, L., Dist. Forester, Mo. Cons. Comm., Jefferson City, Mo.; Univ. of Mich., B.S.F., 1941, (Junior, 1946).

Guttenberg, S., Research Forester, Crossett Exp. Forest, Crossett, Ark.; Univ. of Mich., B.S.F., 1942; Harvard, M.P.A., 1952. (Junior, 1946).

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Shanklin, E. A., Field Asst., International Paper Co., Mobile, Ala.; Ark. A & M., (2 Yrs.).

Williams, O. L., Field Asst., International Paper Co., Sheridan, Ark.

Puget Sound Section

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Johnson, F. J. G., Cons. Forester, 798 Metropolitan Bldg., Vancouver, B. C. (Junior, 1949).

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Mackay, J. B., Land Examiner, Weyerhaeuser Tbr. Co., Centralia, Wash.

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Becker, D. W.; Cason, O. L.; Stafford, J. L.; Wood, W. F.

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Becker, D. W., 704 Ardmore Rd., West Palm Beach, Fla.; Univ. of Fla., B.S.F., 1952. (Student, 1952).

Cason, O. L., Chief Asst. to Nurseryman, Univ. of Fla., Gainesville, Fla.; Univ. of Fla., B.S.F., 1952. (Student, 1952).

Wood, W. F., 1600 Congress Ave., West Palm Beach, Fla.; Univ. of Fla., B.S.F., 1952. Student, 1952).

Member Grade

Ford, J. H., Cons. Forester, Wm. R. Sizemore and Co., Tallahassee, Fla.; Univ. of Fla., B.S.F., 1946; M.S.F., 1951. (Junior, 1947).

Hoffman, G. C., Mgmt. Asst., U.S.F.S., Gainesville, Ga.; Cornell, B.S.F., 1929. (Junior, 31R50)

Strauss, C. W., Forester, U.S.F.S., Decatur, Ga.; Cornell, B.S.F., 1914; M.F., 1915. (Junior, 1939).

Associate Grade

Belcher, W. A., President, W. A. Belcher Lbr. Co., Birmingham, Ala.

Southwestern Section

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Frost, C. C., Jr., Forestry Aide, U.S.F.S., Overgaard, Ariz.; Pa. State, B.S.F., 1951.

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Riggs, A. J., Forester, Gila Nat'l. Forest, Silver City, New Mex.

Upper Mississippi Valley Section

Member Grade

Anderson, E. R., Logging Supt., 511 1st National Bank Bldg., Duluth, Minn.; Univ. of Minn., B.S.F., 1937. (Junior, 1947).

Wisconsin-Upper Michigan Section

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Grosch, W. C., Jr., Arborist, Milwaukee County Park Comm., Milwaukee, Wis.; Univ. of Idaho, B.S.F., 1950.

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Monson, W. H., Area Supv., Consolidated Water Power and Paper Co., Prentice, Wis.; Univ. of Minn., B.S.F., 1940. (Junior, 1947).

Richard Nicholson Gaiser
1915—1952

Dick Gaiser would have wanted a short obituary. He believed that such matters should be brief and to the point.

He was born in Niagara Falls, N. Y., where he completed his high school education. The Bachelor of Science degree was granted to him by the University of California in Berkeley. He earned the Master of Forestry and the Doctor of Philosophy degrees at Duke University in North Carolina. His membership in professional and scientific societies included the American Association for the Advancement of Science, the Soil Science Society of America, the American Society of Agronomy, the Society of American Foresters, and Sigma Xi, the honorary science fraternity.

Dick's graduate studies were interrupted by World War II. He served for four years, chiefly in Burma, where he was awarded the Bronze Star. He was discharged as a First Lieutenant in the Signal Corps.

For the past four years Dick was Soil Scientist at the Buckeye Branch of the Central States Forest Experiment Station at Athens, Ohio. He was the author of several papers published in various professional journals and by the experiment station.

We who worked with him in Ohio and also his many close friends elsewhere feel the loss of his keen mind and his amiable personality. Dick had a sense of high personal and professional integrity; he was remarkably ingenious; and he was an eager competitor in work or play.

His passing was sudden and unexpected. He will be sadly missed, not only by his wife and children, but by all his friends as well. To his close associates he will always be remembered in the manner he wished—as Student, Soldier, Scientist.

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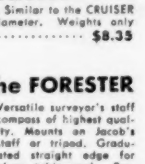

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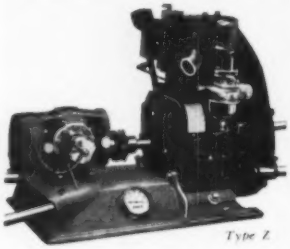

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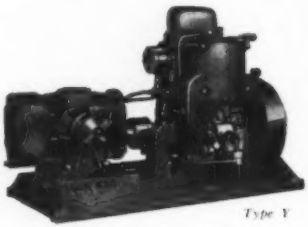

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Forestry News

BOTH FELLOWS of the Society of American Foresters, Dr. Hardy L. Shirley, *left*, has been appointed dean of State University of New York College of Forestry at Syracuse and Dr. Joseph S. Illick, *right*, has been named emeritus dean. Dean Shirley was 1946-49 editor of the JOURNAL OF FORESTRY, member of the national council of SAF 1944-46, and 1933 chairman of the Minnesota section. Dr. Illick, who served as dean of the college at Syracuse for more than six years beginning in 1945, was 1947 chairman of the SAF Division of Education and helped organize, and served as first head of, the executives of the professional forestry schools and colleges.

H. L. Shirley Appointed Dean, College of Forestry, Syracuse

Dr. Hardy L. Shirley has been appointed dean of the State University of New York's College of Forestry at Syracuse, which will begin its 42nd academic year in September. Dr. Shirley had been acting dean since January 1 and previously was assistant dean.

His predecessor, Dr. Joseph S. Illick, has been named dean emeritus. He headed the college for six years, beginning in 1945.

The appointments were jointly announced July 22 by President William S. Carlson of the State University and Justice Francis D. McCurn of Syracuse, president of the board of trustees of the College of Forestry.

The new dean joined the college as assistant dean and professor of forestry in 1945. Previously he was with the U. S. Forest Service 16 years, beginning as a silviculturist in 1929 and serving as director of its experiment station at Philadelphia, Pa., from 1939 to 1945.

Dr. Shirley began his professional career as an educator, however, teaching mathematics at the University of Nevada for three years following graduation from Indiana University in 1922. He entered the School of Forestry at Yale University in 1925 and was awarded the Ph.D. degree there in 1928.

At the College of Forestry, Dr. Shirley has been in charge of the research program, to which New York State gave an initial appropriation the year he came to Syracuse, and which now has its own director and staff of 26 men. He also has directed the graduate studies division, in which 108 students were enrolled during the past academic year.

The post-war increase in the size and services of the college caused Dr. Shirley to recommend administrative reorganization this summer which established divisions for physical sciences, biological sciences, and resource management and new departments of forest chemistry and forest economics.

Dr. Illick was state forester of Pennsylvania before joining the faculty of the College of Forestry in 1931 as professor of forest administration. His service as a forestry educator already has covered 45 years.

Dean Shirley was designated a Fellow of the Society of American Foresters in 1951. He has served the SAF as chairman of its Minnesota Section (1933); national council member (1944-

46); and editor-in-chief, JOURNAL OF FORESTRY (1946-49).

He was instrumental in activating the Forestry Division of the FAO of the United Nations. He is on the national committee screening applicants for lectureship and research awards, under the Fulbright Act, in forestry, soil, science, agronomy, and animal husbandry.

A former member of the National Research Council, Dean Shirley is a Fellow of the American Association for the Advancement of Science, member of Phi Beta Kappa, Sigma Xi, Gamma Alpha, and the professional societies devoted to ecology, botany, and public administration. He is the author of *Forestry and Its Career Opportunities*, textbook announced for August 1952 publication, and numerous technical papers and popular articles.

Construction Starts Alaskan Pulp Mill

The first contingent of construction workers, numbering 75, arrived in Ketchikan, Alaska in May to start work on the installation of Alaska's first pulp mill. The project will involve an investment of $45,000,000 and is the largest industrial enterprise in Alaskan history. Two years will be required to complete the plant.

The mill is being installed by the Ketchikan Pulp Co., a new concern which is jointly controlled by the Puget Sound Pulp and Timber Co., a large established pulp producer of Bellingham, Wash., and the American Viscose Co. of Philadelphia, Pa. It will produce high grade dissolving wood pulp which will be sent to the eastern seaboard area of the United States for processing into rayon and cellophane in plants of the viscose company.

Wood for the mill will come from the Tongass National Forest. The timber-cutting contract held by the company provides for a 50-year supply of timber for a mill of 525-ton daily capacity. The initial plant will produce 300 tons daily, but the capacity is scheduled to be raised to the higher figure within a few years.

All logging is to be done in accordance with forest practices prescribed by the Forest Service. Salmon spawning streams and recreational and scenic features will be protected. The pulp mill is so designed as to prevent pollution of the tidal waters on which it will stand.

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East-West Shifts of Forest Service Personnel

A series of personnel changes, reflecting career advancements and lateral transfers to new areas of experience are being effected in the Eastern and California Regions of the U. S. Forest Service.

Lynne M. Correll, assistant regional forester in charge of personnel management in the East for the past 15 years is transfering to a similar position at San Francisco. Correll has modernized and streamlined employment and personnel policies in the Eastern Region. He has served as personnel procurement and advisement officer for the Northeastern Forest Experiment Station in Upper Darby, Pa.

Ernest M. Karger will return to Philadelphia as assistant regional forester in charge of personnel for the Eastern Region, in charge of fire control direction on the seven eastern national forests. He has been supervisor of the George Washington National Forest, with headquarters at Harrisonburg, Va., for the past three years.

An exchange transfer will bring assistant regional forester Andrew G. Brenneis from the California office to the Eastern Region in charge of forestry information and education work. Brenneis has been in charge of personnel work in the San Francisco office. He fills the position vacated in March by the retirement of John W. McNair.

Another shift announced will bring Supervisor Allan R. Cochran of the Jefferson National Forest, Roanoke, Va., to the Philadelphia office, where he will be in charge of regional forest fire control work.

Filling in the national forest supervisory vacancies created by these transfers and advancements, Supervisor A. H. Anderson will be reassigned from the Monongahela National Forest in West Virginia to supervisor of the George Washington National Forest in Virginia. He will be succeeded by Ephe M. Olliver, at present in charge of regional forest fire control at Philadelphia. Assistant Supervisor George B. P. Mullin, of the White Mountain National Forest, will transfer from Laconia, N. H., to succeed Cochran at Roanoke.

New Portable Brush Grinder

Mitts and Merrill Company of Saginaw, Mich. announce the development of a portable brush grinder that will grind up branches and brush up to 6 inches in diameter at rates of from 2,000 to 3,000 pounds of brush per hour.

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THE RECENTLY COMPLETED AERIAL—PHOTO INTERPRETATION SHORT COURSE for foresters held by the School of Forestry, the Department of Geography and Geology, and the Division of General Extension of the University of Georgia brought participants to the university campus from eight southern states, from Texas to North Carolina. Pulp mills, sawmills, consulting forestry companies, state, and U. S. forest services and federal land banks were represented by the participants. Instructors from forest industry, aerial-photo corporations and the U. S. Forest Service, each a recognized specialist in his field, were brought to the campus to supplement the university staff. Preparations are being made to repeat the course during the Fall of 1952. Persons interested in taking the course at that time can obtain further information by writing the School of Forestry, University of Georgia, Athens.

Dodd Named Assistant Forester, National Park Service

Promotion of John B. Dodd, chief of the administrative branch of the Forestry Division, National Park Service, to the position of assistant chief forester of the Service has been announced by Director Conrad L. Wirth. Dodd succeeds Lawrence F. Cook who was named chief forester a short time ago.

Dodd started to work for the National Park Service in 1932 as a seasonal park ranger in Glacier National Park, Montana. He subsequently served there as assistant forester. He has also served on the forestry staff of the Region Four office of the Park Service in San Francisco. He has been chief of the administrative branch of the Forestry Division in Washington, D. C., since 1949. He is a native of Spokane, Wash., and has a B.S. degree in forestry from the University of Idaho. During World War II he served with the Army in the Pacific Theater and completed his tour of active duty in 1946 as a captain. He now is a major in the Reserve Corps.

T. E. Shaw to Point 4 in Lebanon

T. E. Shaw, professor of forestry at Purdue University since 1946, has joined a Point 4 mission to Lebanon on natural resources under the Technical Cooperation Administration, Department of State. The assignment is for a two-year period.

Compiles Report on Fir Disease

Dr. J. S. Boyce of Yale University, is engaged at the Oregon Forest Products Laboratory this summer to collect and edit four year's research reports on *Fomes pini*.

This fungus has gained wide inroads into Oregon's Douglas-fir forests. According to preliminary reports, *Fomes pini* was found in 5 to 60 percent of nearly 200 Douglas-fir trees located in 14 research stands.

Tabulation and interpretation of all the research on this problem since 1948 will present more accurate ways to estimate the amount of decay in a particular group of trees. More exacting estimates will result in better timber utilization and make for less financial risk to lumber operators. It will also show the relation of internal decay to a stand of timber so it can be determined what ages and on what locations the timber should be cut to reduce losses. Older stands are more apt to carry this fungus, Dr. Boyce said.

Fomes pini research is a cooperative project of several state, federal, and private agencies, including the Oregon Forest Products Laboratory and the Oregon State College School of Forestry. Bruce Wagg, research division of the State Board of Forestry, directed the fungus project since 1951. Dr. Boyce did the first investigations when he was with the U. S. Division of Forest Pathology in Portland from 1920 to 1928.

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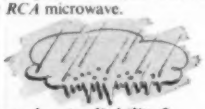

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Regional Advisory Council Meets

A Pacific Northwest Regional Forest Service advisory council has been formed to meet periodically with the regional forester and director, Pacific Northwest Forest and Range Experiment Station. The first meeting was held in the Portland regional office on July 22.

Members of the council are: Col. W. B. Greeley of Suquamish, Wash.; Herman Oliver of John Day, Ore.; G. E. Cannon of Portland, Oreg.; John L. King of Seattle, Wash.; Dave Doneen of Farmington, Wash.; Dr. A. L. Strand, Oregon State College, Corvallis; Edward Sammons of Portland, Jack Rogers of Wenatchee, Wash.; Judge Robert W. Sawyer of Bend, Ore.; Phillip Hitchcock of Klamath Falls, Ore.; Ben Day of Gold Hill, Ore.; Stanley Jewett of Portland; Stanley N. Earl of Portland; and Werner Mayr of Aberdeen, Wash. Col. W. B. Greeley was selected by the council as its chairman.

In commenting on the formation of this new organization, Regional Forester J. Herbert Stone said, "The Forest Service desires the counsel of informed leading citizens of Washington and Oregon on some of our policies and programs and their application to national forest management and research. We believe that such counsel will be helpful in giving more effective and efficient public service."

The function of the advisory council shall be to consider broad questions of policy, program, and procedure affecting the administration of Forest Service activities in the Pacific Northwest, and to give the regional forester and experiment station director the benefit of its opinion. Responsibility for final decisions must remain with the Forest Service in accordance with existing laws and regulations. Members of the council are serving without pay and without reimbursement for travel or expense.

Grayson Completes Ten Years as Consulting Forester

T. F. Grayson, Prescott, Ark. completed in July his tenth year as a consulting forester and partner with his brother in the firm of Grayson Company.

The company handles both small and large properties for residents and nonresidents. In his ten years in Nevada County, Ark., Grayson reports in a recent issue of the *Nevada County Picayune* he has seen a steadily growing interest in sound forest management.

F. P. Keen Named Special Assistant

F. P. Keen, Bureau of Entomology and Plant Quarantine, has been appointed special assistant to the leader of the bureau's Division of Forest Insect Investigations.

Mr. Keen, who will have his headquarters at Berkeley, Calif., will be primarily responsible for coordinating more effectively the research, survey, and control activities of the division in the western states through consultation with cooperators in forest industries and in federal forest land-managing agencies, according to Avery S. Hoyt, chief of the bureau. Mr. Keen has been in charge of forest insect investigations and technical supervision of insect control projects in California.

Most of Mr. Keen's 35 years of forest insect work with the bureau have been in Oregon and California. He had charge of the Bureau's Forest Insect Laboratory at Portland, Ore., from 1929 to 1942, and for the past 10 years has been in charge of a similar laboratory at Berkeley.

In 1947 he received the department's Superior Service Award primarily because he originated a ponderosa pine tree classification for determining the relative susceptibility of this tree to bark beetle attack. This has become a standard timber marking system for the western ponderosa pine.

The Southern Pine Story

The woods, the mill, the men who work with the product of the southern forests—all of these are a part of *The Southern Pine Story*, new booklet published by Southern Pine Association.

With vivid text and colorful illustrations, the 32-page publication describes the products, planning, and progress of the industry.

One of the early sections of the booklet explains southern pine—where it grows and what its species are. This chapter also points out some of the uses of southern pine lumber.

A later chapter tells more specifically the general and specialized uses of southern pine, and a section on properties describes the outstanding characteristics that give it serviceability.

Tracing the history of southern pine and outlining manufacturing progress, other portions of the booklet give an account of the widespread advancements in the industry. Throughout the booklet, the progress in forestry is shown.

More than 300,000 copies of *The Southern Pine Story* are being distributed from the first printing. According to H. C. Berckes, secretary-manager of SPA, this is the first time the complete story of the southern pine industry has been summed up in one publication. Free copies of the booklet may be obtained by writing Southern Pine Association, Box 1170, New Orleans, La.

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An 18-pound portable pump that attaches to a Mercury-powered Disston Model DA-211 chain saw engine without any modification has been developed by the Kiekhaefer Corporation, Fond du Lac, Wisc.

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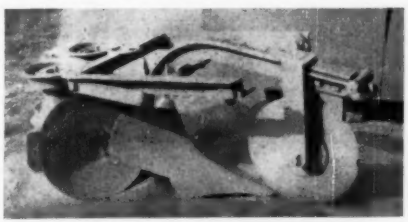

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Forest-Wildlife Research at New York Center

The College of Forestry of the State University of New York at Syracuse has just completed a new research center on the Huntington Wildlife Forest near Newcomb, N. Y. The new building provides nearly 3,000 square feet of laboratory space, offices, and space for storage of records and specimens, as well as a dormitory and kitchen for use of research personnel.

The 15,000-acre experimental forest and the new research center are being used chiefly for wildlife research and management under the direction of Dr. William L. Webb, forest biologist and Earl Patric, assistant forest biologist.

The research program will design and test methods of integrating timber and wildlife programs into a coordinated forest management program. Emphasis is being placed on studies of the effects of logging and silvicultural practices on the wildlife productivity of northern hardwood stands.

The white-tailed deer population of the forest is being given particular emphasis because of its economic importance and because of its effect on the forest. The beaver population is being studied and a program of intensive beaver management is being developed. The fish population in the five larger lakes of the forest are also being studied to determine their status and their relation to limnological conditions.

Considerable emphasis is being placed on fundamental research on the ecology and population dynamics of wildlife species and the ecology of the forest vegetation.

Court Upholds Chapman In Power Case

A regulation which requires power companies building lines across public lands to permit federal agencies to use excess capacity in such lines for transmitting federal power was declared valid by Judge Walter M. Bastian of the United States District Court for the District of Columbia in a decision of June 2, 1952.

In his *Idaho Power Company* v. *Chapman* decision, Judge Bastian stated: "The provision authorizing the head of a Department to grant easements or rights-of-way under general regulations to be fixed by him includes the right to make reasonable regulations, and the regulations adopted seem to the Court to be reasonable and to furnish protection to the plaintiff."

Director Marion Clawson of the Bureau of Land Management pointed out that the decision may have far-reaching effects, since the Secretary's authority to make regulations necessary for properly carrying out his responsibilities has been questioned in connection with other types of rights-of-way.

South Urged to Report Forest Insects

Public and private forest interests in the South are being urged by the Bureau of Entomology and Plant Quarantine to join an all-out campaign to aid forest insect control.

The bureau is heading a drive to organize forest-insect detection and reporting teams that will help to reduce insect damage by periodic inspections of all timberlands.

Anyone interested and willing to assist in the forest insect control campaign in the South may obtain insect reporting forms by writing to the Forest Insect Laboratory, Box 252, Asheville, N. C.

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N. Y. College of Forestry Reorganized

State University of New York College of Forestry at Syracuse has been reorganized into three divisions embracing 10 of its 12 academic departments, including two new departments. The new divisions cover physical sciences, biological sciences, and resource management. The new departments are forest chemistry and forest economics, outgrowths of the long-established departments of pulp and paper technology and forest management, respectively.

The reorganization was recommended by Dr. Hardy L. Shirley, dean of the College of Forestry. Purpose of the groupings, Dr. Shirley explained, is to "distribute administrative duties more equitably and, in doing so, to draw on the mature talents and viewpoints of the experienced faculty members" placed in charge of the divisions.

Two positions of associate dean have been created. Dr. Edwin C. Jahn, director of research, has been designated associate dean for the physical sciences, and continues to direct research. The associate dean for the biological sciences has not yet been announced.

The resource management division has been made the responsibility of Prof. Harold C. Belyea, head of forest management. A third promotion places Prof. Svend O. Heiberg in charge of the college's six forest properties and of undergraduate curriculum study and improvement. Mr. Belyea has been on the faculty since 1917 and Mr. Heiberg since 1927.

Dr. Jahn, professor of forest chemistry and faculty member since 1938, has been appointed acting head of forest chemistry.

Dr. William A. Duerr, assistant chief of the division of forest economics of the U. S. Forest Service, Washington, D. C., has been named professor and head of the forest economics department.

Dr. Jahn's and Dr. Duerr's staffs are men previously in other departments, plus two new appointees who join the forest chemistry group. These are Dr. Michael Szware of the University of Manchester, England, who was named professor of physical and polymer chemistry, a new title, and Dr. Vivian T. Stannett, Mellon Institute Fellow who has been appointed assistant professor of polymer chemistry, also a new title at the forestry college.

Forest chemistry has been given full departmental status, as a result of the College of Forestry's expansion of instruction and research in the chemistry of cellulose and other polymers. The field's importance has grown rapidly with the rise of the plastic industry in recent years and its demand for technically trained men.

Dr. Shirley also said that foresters' and the general public's developing interest in the economics of forestry called for a department devoted to this field. Aside from undergraduate and graduate instruction in the subject, and various spot studies, the college has made detailed studies of forest land-use in New York State counties during the last five years. These continuing projects and their personnel have been assigned the new department.

Besides reorganization of the college, trustees of the College of Forestry have appointed Prof. Raymond J. Hoyle head of the Department of Wood Utilization which offers two majors — Conversion and Distribution, and Retail Merchandising and Light Construction. Mr. Hoyle has been serving as acting head of the department since July 1951, following the retirement of Prof. Nelson C. Brown.

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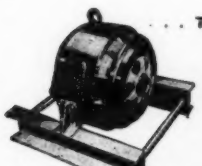

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Ontario-Minnesota Company To Operate Manitou Limits

Ontario-Minnesota Pulp and Paper company will begin harvesting trees this winter for the first time from the rugged timberlands north of Upper Manitou Lake, some 70 miles north and east of Fort Frances.

An estimated 180 woodsmen will harvest more than 13,000 cords of wood from the wilderness area this winter. The concession has been sub-divided into 14 camp operating areas; four will operate this winter.

Next spring logs will be floated down Manitou Lake, through the Manitou river rapids, across Sphene Lake and over the Cascades to Rainy Lake. The logs will be gathered in booms and towed across Rainy Lake to the O-M pulp and paper mill at Fort Frances. In the interest of maximum utilization the larger material will be converted for uses other than pulpwood.

The area consists of about 535,221 acres of which 392,991 acres are productive timberland. The allowable cut for each camp area was established after computing separately the volume and acreage by age for each unit.

California Tree Farm Standards Maintained

Re-inspections of redwood region tree farms, begun in June, indicate that there has been no lost ground since the tree farm program got its start there in February 1950.

The California Redwood Association, certifying agency of tree farms in the redwood region, has sent staff member J. R. Freeman and consulting forester Emanuel Fritz of the University of California, School of Forestry to re-inspect tree farms certified during the past two years to make sure that owners are complying with tree farm management rules.

The two inspectors discovered that working crews are becoming more and more aware of the importance of tree farms in relation to continuance of their jobs; that these crews either make or break a tree farm; that cut-over land is being left productive; and that fire consciousness has reached an all-time high.

They have found, too, that many small holders have become interested in logging their land in such a way that it will produce a sustained yield.

Philippine Products Laboratory

A modern forest products laboratory will be established in Los Banos, Laguna, following approval by Mutual Security Administration of $217,000 for the project.

"Patterned after the forest products laboratory in Madison, Wisc., the Los Banos project will undertake the research necessary to determine the best methods of processing native woods, rattan, bamboo, gums, and tannins into miscellaneous manufactured products," said Winslow L. Gooch, MSA adviser to the Philippine government on forestry products.

Filipino research specialists will be employed and trained in the new project. The services and laboratory's facilities will be made available to Philippine firms to aid in the solution of industrial problems.

The research activities will include timber testing, wood technology, industrial investigations, insect-fungus controls, and the study of forest products other than wood. In the industrial investigations division, special emphasis will be laid on pulp and paper, pressed board, plywood, and veneers.

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Cooperative Research in Forest Soils and Genetics

The Crossett Lumber Company and the Southern Lumber Company will cooperate with the Southern Forest Experiment Station, New Orleans, in financing fundamental research in forest soils and genetics.

The two companies will contribute during the next five years a total of $45,000 toward financing the new projects. Other lumber and pulp companies have indicated an interest in this work and may also participate when the research gets under way.

The Southern Station will provide supervisory personnel, technical specialists, do the planning, and carry out the field and laboratory studies. Most of the work will be centered at the Crossett (Arkansas) Branch of the station, under the general supervision of R. R. Reynolds.

The agreement with the Crossett Lumber Company is for experiments in forest genetics. P. F. Watzek, president of the company, has stated that the objective is to "develop strains of fast-growing, high-quality, pest-resistant, and otherwise superior trees adapted to forest lands in Arkansas and other southern States."

The second agreement, with the Southern Lumber Company of Warren, Ark. provides for basic research in forest soils. According to W. R. Warner, manager of the company, this study will be concerned with determining the physical, biological, and chemical properties of major forest soils in southern Arkansas and adjacent regions, the effects on soils of prescribed burning and various methods of forest management, and other factors influencing the productivity of forest soils.

Dr. Earl Stone, professor of forest soils at Cornell University, has been engaged by the Southern Station as a consultant to help plan the soils study. R. E. Schoenike, who will complete his graduate studies at the University of Minnesota in September, will be assigned to the genetics project.

Ward Heads Mont Alto Branch, Penn State Forestry Department

Wilber W. Ward, forestry instructor at the Mont Alto branch of the Forestry Department, Pennsylvania State College, has been named acting resident director of the branch. He succeeds M. K. Goddard, recently named head of the department at State College, Pa.

Ward is a graduate of Penn State, having received the B.S. in forestry in 1940, and an M.F. degree in 1952. During 1940 and 1941 he was a partner in the Dotahn Lumber Company, Upper Strasburg, Pa., and from 1941 to 1948 was employed as a forester with the Pennsylvania Railroad Company. Since 1948 he has been an instructor at Mont Alto. He is a member of the Society of American Foresters, the Pennsylvania Forestry Association, American Wood Preservers' Association.

Timber from National Forests, 4,418,517,000 Board Feet, 1952

Timber cut from national forests totalled 4,418,517,000 board feet during the fiscal year ending June 30, 1952. This represents a decrease of 269,763,000 board feet from the 4,688,280,000 board feet cut in 1951.

The drop in the amount of timber taken from the 151 national forests is due primarily to the severe winter and late spring. Deep snows stopped logging operations for several months in the Pacific Northwest and California, two of the heavy timber producing regions of the country. The 1952 timber cut of the East, South, and Midwest, on the other hand, showed an increase over the 1951 record.

About 40 percent, or 1,793,505,000 board feet, of the national forest timber cut came from Washington and Oregon. Second highest producing region was California where 665,829,000 board feet were cut from the national forests.

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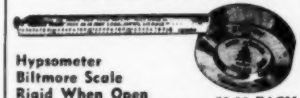

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South Certifies a Million Acres of Tree Farms in 7-Month Period

More than a million acres of Tree Farms were certified in the South during the first seven months of this year, according to records released by the Southern Pine Association.

The 1,145,899 acres certified during the seven-month period already passes the entire 1951 mark by more than 100,000 acres, it was pointed out by H. C. Berekes, secretary-manager of SPA. If certifications continue at the present rate, 1952 could double the acreage certified last year, he said.

A total of 216 areas have been certified, as compared with 251 for the 12 months of last year. This brings the accumulated total of Tree Farms to 1,797. Total acreage through July 31 is 14,865,190.

Alabama led the list of ten states in the number of new areas with 66 certified. Louisiana was highest in total new area with 674,011 acres brought into the system.

Oregon Laboratory Studies Waste Problems

A study to determine the amount of useable wood left on the ground after logging operations in Oregon has been undertaken by the Oregon Forest Products Laboratory.

The main problem, according to J. B. Grantham, acting managing director, is that of matching the usually-thought-of waste material with mills which are adapted to handle such salvage logs.

The study will tell location and volume of the useable wood left-overs in Oregon.

One hundred 1½-acre sample plots are now being studied. Research plots were selected on the basis of ownership, size of operation, and location from the 400,000 acres of forest lands annually cut in Oregon.

The Pacific Northwest Forest Experiment Station has been working part time on the project. Carl Mayer, representing the station, has been general field supervisor. Also cooperating have been the regional office of the U. S. Forest Service and the Oregon State College School of Forestry. J. D. Snodgrass of the OSC forestry school has been field leader of the laboratory crew.

State Forests Begin Timber Cutting

The first large-scale timber cutting on West Virginia state forests will soon begin, Carl J. Johnson, director of the Conservation Commission, has announced.

Milton Harr, assistant state forester, said that a 200 acre tract on Cabwaylingo State Forest in Wayne County is being marked and that the timber will be offered for sale.

Harr said that the tract contains approximately 700,000 board feet and consists of hemlock, red oak, beech, chestnut oak, white oak, and others.

He emhpasized that such practices will be conducted only on state forests and that state parks would in no way be affected.

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Lignosol Production Rising

The official opening of the $1¼-million plant of Lignosol Chemicals Limited last June in Quebec City, climaxed a decade of research and development which brought about the invention, production, and sale of new products.

Lignosol derives from spent sulphite liquor, a by-product of chemical wood pulp. It comes in liquid and in powder forms. It is used in road building as a soil stabilizer, in the manufacture of leather; as a dye leveling agent; as a cement dispersant, an adhesive for gummed tapes, a ceramic plasticizer, a foundry core binder, a refractory binder, and as an additive in electrolytic copper refining.

Lignosol Chemicals Limited was incorporated two years ago with a capitalization of $5,000,000 supplied jointly by the Anglo Newfoundland Development Company, of Grand Falls, Newfoundland, and the Anglo Canadian Pulp and Paper Mills Limited, of Quebec City.

The annual productive capacity of its plant is 22,500 tons, of which some 40 percent is exported to the United States. Close to 100 percent of the plant's raw materials come from the province of Quebec. Sales for 1951, which was the first production year, totalled $230,000; they are estimated at $400,000 for this year, and at $750,000 for 1953.

Heintzleman Cited for Superior Service

B. Frank Heintzleman, regional forester, U. S. Forest Service, Juneau, Alaska was granted a Superior Service Award by the Secretary of Agriculture at the annual Department of Agriculture Honor Awards ceremony held in Washington on May 15. The citation accompanying the award reads: "for courageous, persistent and successful efforts in encouraging the beneficial utilization of forest resources in Alaska."

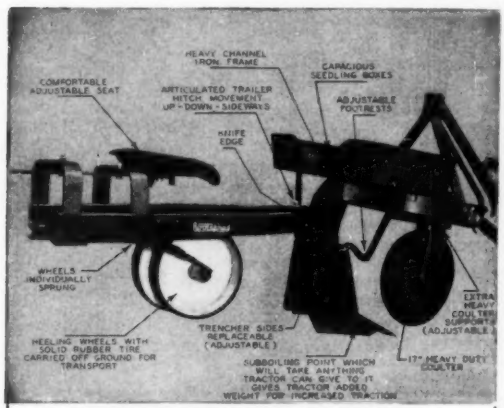
Mr. Heintzleman has been connected with the work of the Forest Service in Alaska since 1918 and has served as regional forester since 1937. He also acts as representative of the Secretary of Agriculture in connection with the work of all bureaus of the department operating in the Territory. Additionally, he is the local representative of the Federal Power Commission in connection with hydro-electric projects.

Heintzleman has taken the lead in developing settlement, and industrial and recreational use of lands in the 21,000,000 acres of national forest lands in Alaska. The recent announcement of the start of construction of a forty million dollar pulp mill at Ketchikan, Alaska is the result of 25 years of effort on his part to bring the huge pulptimber resources of the Tongass National Forest into use under proper forest management.

E. Richard Toole Named to Delta Pathology Post

Dr. E. Richard Toole, who has been affiliated with the Asheville, N. C. office of the Bureau of Plant Industry, Soils, and Agricultural Engineering, has been assigned the duties of hardwood pathologist in the Deep South. He is headquartered with the Southern Forest Experiment Station, Stoneville, Miss., where he will work in close association with the hardwood management group of the U. S. Forest Service, under J. A. Putnam.

Dr. Toole is a forestry graduate of the New York State College of Forestry, Syracuse. He took his doctorate in forest pathology at Duke University.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5. Easily transportable—raise with power lift and drive away.
6. Heeling wheels on indivdiual springs for better heeling.
7. Pneumatic tires furnished at no extra cost.

For further information and close-up photos write

ROOTSPRED
318 N. Market St., Frederick, Md.

FORESTER
Seal-Tite
DRIP-TORCH

Approved for use by U. S. Forest Service

U. S. Patent No. 2376078

Proved superior in over 6 years of field service

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No Flash-back
No fuel slopping
No air pump
No pressure build-up
No explosive vapors
No pre-heating
Instant operation

*

SAFE • EFFICIENT
RELIABLE • ECONOMICAL

*

Burns Diesel Fuel or Stove Oil
1¼ Gallon Capacity
Weight loaded 16 pounds

Write for descriptive folder and price list.

WESTERN FIRE EQUIPMENT CO.
69 Main St., SAN FRANCISCO, California

Keys to Forestry: Research and Education

The keys to future progress in forestry are research and education, the chief of the U. S. Forest Service said in an address at Stephen F. Austin State College in Nacogdoches, Texas.

In Nacogdoches on an inspection and speaking tour, Lyle F. Watts attended the College's third annual Forestry Field Day. The event, designed to promote interest in better forestry, included competitive contests in various phases of forestry between high school students in one division and college youths in another.

The banquet, at which Mr. Watts spoke, highlighted the field day. The audience of educators and lumbermen were told that the demand for forest products would continue to increase. The United States can meet this demand if better forest management is employed. Research and education make possible better management.

Praise was given by Mr. Watts to the S. F. A. College Department of Forestry, the only one in Texas offering a forestry degree. W. R. Owens, heads the department.

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiation.

Positions Wanted

Forestry graduate to assist in intensive management of small plantation in southeastern United States.
Box L, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, 28, B.S.F., M.F., 5 years with U. S. Forest Service; 3 of these in report preparation and writing. Some experience in free lance writing. Desires position on editorial staff of forestry, conservation, outdoor, or wood utilization publication, either state or private. Prefers midwest. Family man. Details and references on request.
Box M, Journal of Forestry, Mills Building, Washington 6, D. C.

B.S. Michigan State, MF Yale, 1952; 25, married, two children. Desire position with progressive organization in the northeast. Experience in cruising, scaling, surveying. Some work in photogrammetry. Now temporarily employed by the U. S. Forest Service. Willing to work hard. References and details on request.
Box Q, Journal of Forestry, Mills Building, Washington 6, D. C.

Tree Improvement Committee Sponsors Publications

The Committee on Southern Forest Tree Improvement, representing various state, federal, and private forestry agencies in the South, is the sponsor of two new publications dealing with the selection and breeding of superior trees for the southern timber industry.

Titles of the publications are *Hereditary Variation as the Basis for Selecting Superior Forest Trees*, and *Directory of Forest Genetics Activities in the South*. Both were written by Keith W. Dorman of the Southeastern Forest Experiment Station, chairman of the Tree Improvement Committee's subcommittee on tree selection and breeding.

Copies are available from the Southeastern Forest Experiment Station, Asheville, N. C.

NLMA Issues New Guide to World's Wood Research

More than 17,000 research projects on wood and other forest products, conducted by nearly 3,000 domestic and foreign organizations, firms, and agencies, are catalogued in the new fifth edition of the *Forest Products Research Guide* to be issued this month by the National Lumber Manufacturers Association, according to C. A. Rishell, director of research.

The book is a comprehensive directory of specific projects and the firms or organizations conducting them in all the extensive fields of wood research throughout the world. The material, filling almost 400 pages, was compiled by the NLMA staff in cooperation with that of Timber Engineering Company's research laboratory.

The guide is used by research personnel in keeping posted on research activities in their particular fields, and so avoid unnecessary and costly duplication of effort. It provides means of contact between individuals or agencies having mutual project interests. Students, teachers, and writers find an extensive source of reliable material in the publication.

Price of the guide is $10.00, and a limited quantity is being printed. Copies may be ordered from National Lumber Manufacturers Association, 1319—18th St., N.W., Washington 6, D. C.

Pacific Lumber Co. Appoints Research Director

William G. Van Beckum has been appointed director of research and development for The Pacific Lumber Company, which has announced plans to continue its expanding program of development in utilization of redwood by-products.

Since 1948, Van Beckum has been manager of technical service and assistant sales manager, Special Products Division, Weyerhaeuser Timber Company, Longview, Wash. A graduate of St. Norbert College and the University of Wisconsin, he worked under a TAPPI Fellowship for three years at the U. S. Forest Products Laboratory at Madison, Wisc. In 1939 he joined the Wood Conversion Company, and in 1942 became chief of the Chemistry Section of the Weyerhaeuser Development Department, of which he was named assistant manager in 1946.

A major producer of redwood lumber, The Pacific Lumber Company has pioneered research in utilization of bark and other wood raw materials. The company's chemical derivatives and other by-products are finding application in oil well drilling, leather tanning, and in the manufacture of ceramics, rubber, plastics, specialty papers, and additional industrial products. Redwood bark fiber insulation is one of the company's major by-products. Production facilities are located in Scotia, Calif. Van Beckum will make his headquarters at the firm's San Francisco office.

WANTED

ASSISTANT GENERAL LOGGING SUPERINTENDENT

with at least 10 years successful experience in Eastern Canadian Pulpwood Operations

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LARGE PULP AND PAPER COMPANY

LOCATED IN ST. MAURICE VALLEY, PROVINCE OF QUEBEC

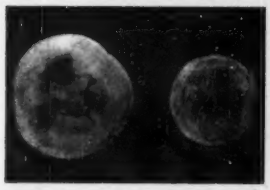
Applicants should be 30-40 years of age and bilingual.
This opening presents unusual opportunities.
Salary fully commensurate with qualifications and experience.
Our staff has been notified of this advertisement.
Applications will be treated confidentially.
Reply, giving full particulars: experience, training, age, marital status, etc.

Box O, Journal of Forestry, Mills Building, Washington 6, D. C.

HERE'S PROOF *that* OSMOSE TREATED LUMBER *Lasts Longer*

The board at the left is a piece of Osmose treated Lumber and was subjected to severe exposure tests. Upon examination it was found to be strong and healthy, unaffected by fungi or wood destroying insects.

This piece of ordinary, untreated lumber was subjected to identical exposure tests and the difference in appearance speaks for itself. This board had lost most of its natural strength, crumbled in the hand and was practically consumed by pests that habitually attack unprotected wood.



The light areas in these cross sections from Osmose treated posts graphically portray the deep penetration of the toxic salts. Small dark areas deep in the center of the wood are only spots not fully protected.

Here's what happens when you build with untreated lumber that is subjected to moisture. This porch built directly on the ground would have lasted 3 to 5 times longer if it had been constructed of Osmose treated Lumber.

★ ***WON'T ROT!***
★ ***REPELS TERMITES!***
★ ***LASTS 3 TO 5 TIMES LONGER!***

Men who know lumber also know that lumber doesn't just wear out . . . it is literally "eaten up" by fungi and hordes of wood destroying insects. However, Osmose treated Lumber stops these pests cold! Osmose treated Lumber is ordinary lumber that has been treated with Osmosalts (a highly toxic chemical mixture) that makes it resistant to decay and termites.

Naturally, the user pays a small premium for Osmose treated Lumber, but when you consider that it lasts 3 to 5 times longer, is fire retardant and NEED NOT BE PAINTED, the use of untreated lumber appears impractical indeed. Osmose treated Lumber, unpainted, is ideal for modern ranch-type houses, cottages, barns, outbuildings, bridges and all types of industrial construction. If you prefer, Osmose treated Lumber can easily be painted and the green treatment color acts as a base coat, thereby saving on paint.

Everything we say about Osmose treated Lumber has been proven over and over again during the past 15 years by our users as well as the Federal Government who have made exhaustive tests. Proof of these service tests is on file and you may have copies by writing to our headquarters. Osmose treated Lumber is sold through Authorized Producers whose operations are supervised and directed by graduate foresters trained specially by the OSMOSE WOOD PRESERVING CO. OF AMERICA, INC., 1437 BAILEY AVE., BUFFALO 12, N. Y.

OSMOSE TREATED LUMBER

Basal bark spraying of weed trees

gets results

Like This!

Spraying the basal portions of trees and brush with Esteron® 245 in diesel oil or kerosene is a new development in economical forest management. This *effective* technique—spraying the base of brush stems or tree trunks—controls "weed" species shading out young pines and other desirable trees. Basal bark spraying is more economical than cutting, and extensive regrowth which usually follows cutting is greatly reduced. Basal spraying can be done *any time of year.*

Esteron 245 contains powerful, proved, low-volatility propylene glycol butyl ether esters of 2,4,5-T. The oil carrier helps penetrate the outer bark—the chemical reaches the live tissues and and kill is achieved. (For foliage application during the growing season, use Esteron Brush Killer containing low-volatility esters of 2,4,5-T and 2,4-D.)

Both Esteron 245 and Esteron Brush Killer are useful also for spraying cut stumps to prevent resprouting.

Our sales and technical men are available for consultation and assistance. Write for full particulars on "weed" tree control.

Esteron 245 and Esteron Brush Killer

Containing new low-volatility esters

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